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ANIMAL VENOMS: A REVIEW.

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A much outstanding episode in this story has been the publication of Madame PHISALIX's great work, *Animaux Venimeux et Venins*, already reviewed in this *Bulletin* (Phisalix 1922); from whatsoever point of view regarded, it is, in the words of its sponsor, LAVERAN, the most comprehensive and complete volume existing in any language on the science of animal venoms. From this vast array of facts we are led to the conception of animal venoms as not merely a means of defence and attack against gross outward dangers, peculiar to a few special groups of animals, but rather as products of the widest prevalence in the animal metabolism, subtilely influencing nutrition and thereby promoting that cellular resistance which forms the natural defence against the invisible dangers of the microcosmos. And from this clear standpoint the author's prophetic eye foresees for animal venoms a local habitation among pharmacologists and a name in rational therapeutics.

Snake Venoms.

Much has been done in recent years to extend and particularize our knowledge of snake-venoms along established, mainly physiological, lines; but it seems unlikely that research of this sort, however interesting, will be further reproductive until it looks beyond its immediate application to the treatment of snake-bite. In reviewing recent publications it will be convenient to take first those that deal comprehensively with snakes and their venoms from every point that comes in the purview of the medical man; then those that have mostly to do with treatment, and particularly with antivenenes; and finally those of which the interest, for the present, is almost entirely physiological and chemical.

Of the first kind, must be mentioned, before all, "Studies in the Treatment of Snakebite" by ACTON & KNOWLES (1914–1915) and Vital BRAZIL's "La Defense contre L'Ophidisme" (1914); both are works of universal interest, although the former is based on the snakes of India and the latter on those of South America; both have been reviewed at considerable length in this Bulletin (ix. p. 237 & vi. p. 236).

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PHISALIX (1922) also treats snakes and their venoms in most comprehensive detail. Of a more limited interest are YAMAGUTI's two papers on the venomous snakes of Formosa. The second of these (1923), which is an amplification of the first (1922), is a monograph of the Thanatophidia of the island, and, proceeding along beaten roads, goes very fully into all the anatomical details of the venom apparatus, physiological effects of venom, action of antivenenes, etc. KAISER (1921) deals with the venomous snakes of the Dutch East Indies and the preparation of antivenenes there; and KRAUS (1922) with the aglyphe and opisthoglyphe Colubridae of Brazil and (1923*b*) with the venomous snakes of that country, though he gives us nothing unexpected. Reference may here be made to a paper by HOUSSAY (1923*b*) on deadly snakes of the Argentine and the amounts of venom yielded by several local pit-vipers.

To take next recent papers dealing with antivenenes and of other matters bearing on treatment.

C. & M. PHISALIX showed some time ago that rabbits immunized to the mucous venom of the salamander became to a limited extent refractory to the virus of rabies and, conversely, METCHNIKOFF stated that the serum of rabbits vaccinated with rabies is remarkably active against snake-venom; some regard must therefore be paid to the "summary," published without any details in the *Japan Medical World*, of a paper by YAMAGISHI (1922), wherein it is stated that a rabbit immunized to "adder" venom was found subsequently to be immune to the "virus of hydrophobia."

Although CALMETTE appears to have always had an open mind on the subject, and although PHISALIX showed that immunity to hornet venom conferred a limited immunity to viper-venom, other authorities have until quite lately insisted most positively upon the strict specific limitations of antivenenes. KRAUS and BOTELHO (1923*a*, 1923*b*), however, record experiments suggesting that antivenenes contain primary and subordinate antitoxins, or at least have quantitative as well as qualitative values which can be determined only by experimentation. These authors found that *Elaps frontalis* antivenene after an hour's contact can neutralize (at 37°C.) a four-fold equivalent of *E. corallinus* venom, and (at 32°C.) a lethal equivalent of *Crotalus terrificus* venom, although the Crotalus antivenene does not neutralize the Elaps venom; they also found that after contact for an hour at 37°C. scorpion antivenene can neutralize *Lachesis lanceolatus* venom, and conversely that snake antivenene can neutralize scorpion venom. We are here reminded of EHRLICH's toxones and toxoids. WILNER, again (1923), relates the case of an Arab wounded by a scorpion, where the vivid effects of the scorpion venom were relieved at once by a small injection (3 cc.) of ophidian antivenene originally obtained from the Lister Institute. Furthermore, HOUSSAY and NEGRETE (1923*a*) in a paper containing a list of the amounts of specific venoms neutralized by the various antivenenes prepared at their Institution, state that although antivenenes are specific they are not so strictly so as to be entirely impotent against venoms of closely related species. Incidentally these authors confirm the fact that "normal" (? unheated) horse-serum has a certain power of neutralizing snake-venom; they state that it nearly always neutralizes 1 to 3 lethal doses of several specified venoms, and in the case of *Aneistrodon piscivorus* venom can neutralize 5 lethal doses. This property of (unheated) horse-serum may have to be borne in mind in connection with the argument of KRAUS & BOTELHO.

To turn to less stimulating topics, GOMES (1920) records experiments contrasting the efficacy of Lachesis antivenene when administered promptly with its failure when delayed; HOUSSAY and NEGRETE (1921*a*) have a paper on the varying duration of activity of different antivenenes and on standarding the value of a kept serum, and another (1921*b*) on the mathematical expression of the neutralizing powers of antivenenes; and KRAUS (1923*b*) gives some statistics of results of cases of snake-bite treated by antivenene in Brazil. Two papers by GIOSEFFI (1923) on viper-bite and its treatment do not contain anything arresting, and the same may be said of accounts of several cases of snake-bite summarized in the Medical Zoology section of this Bulletin, although it may be mentioned that CROLEY (1922) in describing a case of cobra-bite happily treated with antivenenes and other things attributes some of the success to the adjuvancy of atropin.

Coming next to work of which the interest is mainly physiological or biochemical, mention must first be made of the very important series of papers by HOUSSAY and NEGRETE (1918) and HOUSSAY and SORDELLI (1918). These authors have investigated in comprehensive detail the diastatic, cytolytic, haemolytic, and thrombotic properties not only of the principal snake-venoms of South America, but also of the venoms of some of the notorious snakes of Asia and Australia. Further researches on the action of various snake-venoms (*a*) upon the blood have been carried out by HOUSSAY and NEGRETE (1922), by HOUSSAY, OTERO, NEGRETE and MAZZOCCO (1922), and by DO AMARAL (1921) and upon the heart by MAGENTA (1922); (*b*) upon globular resistance, by AQUINO (1920); (*c*) upon nerve and muscle by HOUSSAY and PAVE (1922), HOUSSAY, NEGRETE and MAZZOCCO (1922), and by HOUSSAY and GUGLIELMETTI (1923); and (*d*) upon the bulbar centres by PACELLA (1923). HOUSSAY and NEGRETE (1923) also have described in detail the action of the venom of *Lachesis ammodytoides*, which appears to be typically viperine; and HOUSSAY (1923*a*) in comparing the local effects of some different species of venoms shows that they are not parallel with their several haemolytic and coagulant properties. ISHIHARA (1920) describes the physiological action upon tissue—particularly upon muscle—of the venoms of cobra and Lachesis, and SUZUKI (1921) describes the histology of the acute and chronic nephritis caused by the venom of *Lachesis flavoviridis*. A suggestive paper, deserving particular attention, is that by GUNN and HEATHCOTE (1921) on tissue-immunity—as distinguished from blood-immunity—to cobra venom; the experiments of these authors show, inter alia, that in laboratory animals the heart and intestine (the particular tissues tested) acquire immunity independently of the antitoxin circulating in the blood. Of minor papers those of CATAN (1921) and CATAN DE HOUSSAY (1921) on the adsorption of snake-venom by charcoal, and that of ASSUMPÇÃO (1922) on the specific differentiation of snakes by the blood-precipitin test may be mentioned. A series of papers by KRAUS (1923*a*) on the properties of antivenomous serums produced in Brazil must also be mentioned.

Venomous Amphibia.

The cutaneous venoms of toads and salamanders are fully described and discussed in Madame PHISALIX's great work (1922). They are derived from two sources, namely from mucous glands disseminated in the skin, and from "granulous" glands massed in definite formations at particular spots in the dorsal integument, as in the parotid regions

of the toad. More recently Madame PHISALIX (1923) has investigated these venoms in *Bombinator pachypus* (a species akin to the firebelly toad and having a very poisonous reputation): the mucous venom causes paralysis, finally of respiration, and in warm-blooded animals (mouse) hypothermia; the granulous venom is convulsant and afterwards paralytic. NOVARO (1922, 1923) has examined the parotid (granulous) venoms of toads of Buenos Aires: locally they cause inflammation and suppuration, and their general effect is mydriatic, salivatory, convulsant and paralytic, finally involving the breathing mechanism; the chief toxic constituent in *Bufo marinus* is said very much to resemble adrenalin (although it does not modify the coagulation of the blood). MATSUSAJI and KABEDA (1918) have dealt at some length with the cutaneous venom of *Triton pyrrhogaster*; it contains two distinct toxins—a haemolysin, and a neurotoxin that first excites and then paralyses the skeletal muscles and, finally, respiration.

Venomous Fishes.

PHISALIX (1922) devotes 143 pages to venomous and poisonous fishes and describes the venom-apparatus and venom of some of those that can inflict a serious wound with spine or tooth. KABESHIMA (1918) appears to have carried out an exhaustive investigation of the venom of *Plotosus anguillaris*, one of the common Indo-Pacific catfishes; it seems to be produced by cystic distensions of the glands at the base of the great dorsal and pectoral spines, and to contain a haemolysin, and a "spasmin" acting on the medulla and cortex. The reviewer had some personal experience, about 35 years ago, of the venom of *Plotosus arab*; a finger wound from a young fish not 3 inches long caused—besides excruciating pain—numbness and paresis of the arm, lasting for several days; in sections of well fixed decalcified material no special glands—other than the slime glands of the skin—were found. In a paper by EVANS (1923) glandular masses are described and figured in the grooves of the dorsal spine of the stingray (*Trygon pastinaca*), the piked dogfish (*Acanthias vulgaris*), and the Port Jackson shark (*Cestracion philippi*); in the same paper some of the effects of the venom of the well-known weever fish are described. Two cases of wounding by stingrays are recorded in the *Archives de Médecine et Pharmacie Navales* for November 1922, and ESSERTEAU (1920) describes the effects of a venomous wound inflicted by an Indo-Pacific species of Aploactis (Scorpaenidae).

Scorpion Venom.

This is a subject particularly well treated by Madame PHISALIX (1922). The venom of different species of scorpions, as of snakes, varies very greatly in virulence, some species being known to be more than twenty times more venomous than others. HOUSSAY (1919) describes the physiological effects of the venom of *Buthus quinquestriatus* and *Tityus bahiensis*; it is a muscle poison of the veratrin type, affects arterial tension like adrenalin, and is a powerful salivary and lachrymal stimulant. KRAUS and BOTELHO (1923*a*) suggest that scorpion antivenom, like snake antivenom, contains primary and secondary antitoxins, since in their experiments a scorpion antivenom after an hour's contact at 37°C. could neutralize *Lachesis lanceolatus* venom. WIENER (1923), conversely, found that Lister ophidian antivenom was a swift antidote to scorpion venom. As already said

in connexion with this argument, it may have to be borne in mind that normal horse-serum, if unheated, can neutralize at any rate some snake-venoms to a considerable extent.

Spider Venom.

Recent observations have again confirmed the existence of truth in the strangest spider stories. ESCOMEL's work on *Lathrodectes mactans* and *Glyptocranium gasteracanthoides* is reviewed, inter alia, in Madame PHISALIX's monograph, and further observations by ESCOMEL (1919) have been summarized in this Bulletin (xvii, 126). HOUSSAY & NEGRETE (1919) also have recorded the serious or fatal effects of the venom of Lathrodectes and other Theraphose spiders on laboratory animals, and BAERG (1923) gives the personal experience of a Thomas who would not believe until he had felt the effect of Lathrodectes venom for himself. SUTHERLAND and others (1921, 1922) describe the symptoms following the bite of an Indo-Australian species, *Lathrodectes hasselti*, and LOUIS (1921) and CAVASSA (1921) report the unpleasant or serious consequences of the bite of some unspecified spiders.

Attention may be drawn here to papers by DODD (1921) and MCCORMACK (1921) on Tick-bite paralysis.

Centipede Venom.

Conflicting observations justify the natural assumption that the venom of centipedes differs in virulence, like that of snakes and scorpions, in different species. Thus while CORNWALL (1916), in his excellent and comprehensive account of three Indian species, states, from experiment, that their venom is little toxic, BAYLEY DE CASTRO (1921) describes the bite of a certain Andaman species as being not only extremely painful but also as having serious consequences. PINEDA (1923) also records 4 cases of centipede bite in the Philippines in which local symptoms—inflammation, spreading oedema, numbness, and formication—might be followed by lymphadenitis persisting for a week or more ; one of these cases—a girl of 7 years, bitten, during sleep, in the head—ended fatally in about 29 hours, and at the necropsy besides the superficial oedema there was congestion of the meninges. LEVY (1923) has discovered an haemolysin in the venom of certain centipedes. In some species the venom acts directly; in other species the haemolytic action is elicited only after the venom—even in minute quantities—has been in contact with yolk of egg. This latter catalytic effect is comparable to that produced in the same circumstances with cobra venom.

Venom of Medusae (Jelly-Fish).

Cases of lesions following contact with unspecified "jelly-fish" have been recorded by ALLEN (1920) and STEWART (1922). The local rash in ALLEN's case was followed by profuse weeping eczema, by aphonia, and by laryngitis lasting for four weeks. AOKI (1922, 1923) portrays the severe effects, besides urticaria, of stinging by *Olindioides formosa*—shock, acute cardiac distress, dyspnoea, muscle pains, and as a possible sequela, emaciation. The reviewer, from his experience in the Indian Marine Survey, can endorse the statement as to serious and enduring sequelae to stinging by medusae.

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* References are to summaries in the *Tropical Diseases Bulletin* unless otherwise stated. Dates in brackets are those of the original papers and do not alway correspond with the date of the respective *Bulletin*.

LEPROSY.

MUIR (E.). **Some Notes on the Transmission of Leprosy.**—*Indian Med. Gaz.* 1923. Dec. Vol. 58. No. 12. pp. 572–575. With 1 chart.

The available facts enable us to decide with a moral certainty how the bacillus enters the body. The organism cannot be cultivated, and healthy human beings in a good climate are commonly insusceptible even to inoculation with it. Among 60 members of the menial staff of the Calcutta School of Tropical Medicine 8 per cent. had leprotic anaesthetic patches without knowing it. Advanced mutilated begging anaesthetic lepers with trophic ulcers are not infective, as their skin and ulcers are free from the bacilli, although the Indian leper act is erroneously based on the belief that they are the dangerous persons. The nodular type is that of the infective cases, yet they feel well and continue their work, and during the reactionary stage of the disease they shed innumerable bacilli from their skins and ulcerated oro-nasal mucous membrane.

Early leprous lesions have never been found in the gastro-intestinal tract below the pharynx, which tells strongly against oral infection. The first noticed lesions in over 1,000 Indian asylum cases were chiefly on the extensor surfaces of the limbs, and in hilly regions frequently on the feet, and more still on the face, indicating direct infection through the skin of areas uncovered by clothes, a moist hot climate predisposing to infection as ROGERS showed. The promiscuous use of bedding favours house infections in India. There is presumptive evidence that, as in tuberculosis, a comparatively small proportion of those infected ever develop the disease owing to natural immunity. Voluntary segregation of infectious bacteriologically positive cases is advocated.

Prophylaxis.—Muir therefore suggests as the most effective way of reducing leprosy the opening of out-door dispensaries in all provincial towns in all endemic areas under trained workers, for the treatment of early cases, advanced disfigured patients not being admitted, leprosy being even more suitable than tuberculosis for such treatment. Infections are mainly house ones in persons up to 20 years of age, and only 11 per cent. were attacked when over 40, conjugal infections being only 2·9 per cent. In 58 per cent. previous contact with lepers was traced, chiefly with infected parents or grandparents.

L. Rogers.

CHINA MEDICAL JOURNAL. 1923. July. Vol. 37. No. 7. pp. 562-567.—**The Diagnosis of Leprosy.**

This is a reprint of a pamphlet by Dr. E. MUIR, Leprosy Research worker of the Calcutta School of Tropical Medicine. After pointing out that the ignorant public fluctuate between panic on hearing of leprosy and indifference regarding contact with lepers, the importance of early diagnosis, to allow of rapidly efficient treatment, is emphasized. Diagnosis depends either on finding the lepra bacilli in the deeper layers of the skin (obtained by removing a portion of the whole thickness of the skin from a non-anaesthetic patch and staining smears from it); on or demonstrating the anaesthesia of the skin in the ordinary way. Other subsidiary signs are deep analgesia, loss of thermal sense, hyperaesthesia preceding anaesthesia, depigmentation, erythematous patches (often the first sign), thickening of the superficial nerves (ulnar, peroneal,

great auricular, radial and external saphenous nerves in that order of frequency), parakeratosis, anhydrosis, and interfollicular swelling (due to leprous infiltration of the skin between the hair follicles). The skin lesions have to be differentiated chiefly from syphilis, psoriasis and tinea ; and the nerve cases from syringomyelia (in which loss of sensation to light touch is not an early or important symptom) ; and lung leprosy (in which large bundles of lepra bacilli may be found and the disease clears up more readily under treatment) may have to be distinguished from pulmonary tuberculosis, although rarely both may exist together. Leprosy may also co-exist with syphilis, hookworm, malaria, etc., and these must be treated if the leprosy is expected to improve.

L. R.

GOMEZ (Liborio). [In English and Spanish.] **The Question of the Initial Lesion of Leprosy. El problema de la lesion inicial de la lepra.**—*Jl. Philippine Islands Med. Assoc.* 1923. Sept.-Oct. Vol. 3. No. 5. In English, pp. 227–229. In Spanish, pp. 263–265.

The first noticed manifestation of leprosy in 100 cases was numbness in 52, cold sensation in 1, red spots on the face in 16, and on the lower extremity in 9 ; white spots in 11 (half being on the face), nodules in 5, nasal lesions in 2, and miscellaneous in 4. Nervous manifestations were therefore most frequent, while multiple spots not rarely appeared at the same time, so it is not considered possible to point to any particular lesion as certainly the site of entry of the bacillus. Primary nasal lesions were rare.

L. R.

ANDŌ (Nihei). [**Klinische, bakteriologische und serologische Studien ueber Lepra.**]—*Fukuoka Ikw. Daig. Z.* 1921. Vol. 14. pp. 123–194. [Summarized in *Japan. Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 3. p. 260.]

273 specimens of the skin from 146 lepers were examined. The author disagrees with the present classification of cases, and prefers to divide leprosy into three stages similar to those of syphilis and tubercle. He found 8 species and 35 subdivisions of the lepra bacillus, which could be arranged in four main groups. He also carried out complement fixation experiments using leprosy bacilli and calf's heart-muscle as antigens.

L. R.

ROGERS (L.). **The Present Position of Leprosy Prophylaxis.**—*Jl. State Med.* 1923. Dec. Vol. 31. No. 12. pp. 569–584.

This paper begins with a rapid review of the present world-incidence of leprosy, especially as regards its correlation with humidity and temperature, a summary of the fuller account by the author which appeared in a recent issue of the *Transactions of the Royal Society of Tropical Medicine and Hygiene.* Other conditions tending to favour the spread of the disease, such as promiscuity, backward civilization, education and general hygiene, are then briefly dealt with. Very interesting figures are given to prove the greater susceptibility of the young and the effects of close contact, particularly with cases of the nodular form. The whole problem of prevention of spread may be summed up in

avoidance of contact between lepers and susceptible healthy individuals, a matter less easy of accomplishment than would appear on a superficial view, for it embraces several problems, such, for example, as the detection of cases in an early stage, and patients will naturally conceal the disease if they think that to declare it will entail forced separation from their relatives and friends. This attitude will only be overcome if they can look with a fair degree of hope towards a cure of their condition.

Instances are given of the good effects which have resulted from measures of segregation properly carried out in various countries, such as Norway, Sweden, Iceland, Eastern Canada, etc. A most instructive contrast is afforded by Hawaii. In 1865 a segregation law was passed and a settlement started at Molokoi, but the law was allowed to become a dead letter and the incidence remained little, if at all, affected. During the first 29 years of American control, with more stringent enforcement of the law, the rate per mille was reduced from 13·5 to 2·16, or less than one-sixth. Several of the British possessions are mentioned to illustrate the results of isolation and segregation when properly enforced and when carried out half-heartedly. In India the incidence rate has been reduced by half in the last 50 years, although even in 1921 only 7·7 per cent. of the known lepers were isolated ; in 1911 the figure was 4·7. A great advance in the method of dealing with the leprosy question in India will be gained if the proposal to include in the leper colonies one section for the treatment of advanced and maimed cases in hospital, another for the " cottage " treatment of earlier cases, and a third for healthy children of lepers, is brought to a successful issue. In Ceylon, where segregation is inefficiently carried out, there has been practically no improvement.

Jamaica and Trinidad provide an instructive comparison. In the former segregation enforced has brought about a steady reduction, so that the incidence rate is less than half what it was 30 years ago, and " leprosy is now a rare disease," In the latter, measures are inefficiently carried out ; compulsory segregation with insufficient accommodation and a system which does not prevent a considerable number of cases " absconding " have resulted in a steady increase in the incidence rate. The establishment of a Federal Leper Colony, as suggested by the Leprosy Commission of 1919, should ameliorate these conditions. Africa, more particularly South Africa and the Tanganyika Territory, is showing some degree of improvement since the matter was seriously taken in hand ; prior to that time (1921) only a small proportion of those in an advanced stage of the disease was isolated and there had been a steady increase in incidence, as in all places where measures are formulated but not enforced. The ideal methods of prophylaxis consist of (1) Compulsory notification of cases by medical men and householders ; (2) Compulsory segregation ; (3) Detection of early cases by periodic examinations ; (4) Prohibition to lepers of certain trades connected with food, clothing, etc. ; (5) Removal of children of leper parents as soon as possible after birth ; (6) Control of immigration.

This paper is a mine of information, and should be studied by all men practising in countries where the disease occurs. Space precludes even a mention of more than a few of the points dealt with.

H. Harold Scott.

GARCIA MEDINA (Pablo). **Profilaxis y estadística de la lepra en Colombia.** —*Gac. Med. de Caracas.* 1923. Feb. 28. Vol. 30. No. 4. pp. 56–59.

A most interesting paper. The author affirms that the number of lepers in Colombia recorded in American and European books, namely 20,000, is far in excess of the actual number, which is between 6,000 and 7,000. The law relative to notification is very strict, so that it is improbable that the total exceeds appreciably the official returns of 6,568, or about 1 per 1,000 of the population.

As far as possible, segregation is carried out on the colony system. 5,440 (or 79 per cent.) are thus dealt with in the lazarettos; 2,271 [the figure is given elsewhere as 2,771, but the lower is probably correct] at the "colony" of Agua de Dios; 2,456 at that of Contratación; and 213 at Caño de Loro, situated on a small island in the Atlantic.

By the colony system the patients live as nearly as possible a normal life, civically, socially and industrially. There are magistrates, police, a municipal council, and so forth. Well-staffed and well-equipped hospitals and schools are provided, entertainments and recreation arranged for, and land allotted for cultivation. Each colony has its own metal money which is valueless elsewhere.

As regards the type of disease, 60 per cent. are of the nodular variety, 30 per cent. of the nervous, and 10 per cent. mixed. The idea that leprosy is a poverty disease is controverted in Colombia; the majority of sufferers are agricultural labourers who earn good wages, and the disease is more prevalent in rural districts than in towns. The influence of climate is noted. The incidence is greatest (55·9 per cent. of the whole) where the mean annual temperature is between 20° and 24° C. and the relative humidity is high; next to this are districts with a temperature between 25° and 28° C., or 14° and 18° C. Warm and dry areas with a temperature of 29°–32° C., or cold districts (8°-12° C.) present the fewest cases.

In the matter of treatment good results were obtained temporarily by the use of atoxyl in doses of 30–50 cgm. daily, and by sodium salicylate or methyl salicylate. The amelioration, however, was not maintained and these forms of treatment have been largely superseded by chaulmoogra oil.

Intravenous injections of sodium gynocardate did not yield satisfactory results. 350 patients have been treated with the ethyl esters of chaulmoogra with marked benefit.

H. Harold Scott.

RUTOWITCZ (Bernardo Leibowitz). **Tratamento e prophylaxia da Lepra.**—*Sciencia Medica.* Rio de Janeiro. 1923. Oct. 31. Vol. 1. No. 4. pp. 173–180.

During the twelve months ending June 1923, there were 526 new admissions to the Institute for the Treatment of Leprosy, Pará. 298 were definite cases of the disease and 228 were admitted for observation. Of the 298 there were 83 of the tuberculous form, 201 of the anaesthetic, and 14 mixed. The treatment adopted was chiefly that of Heiser, chaulmoogra oil in camphorated oil, but intravenous injections of hydnocarpate of sodium and the ethylic esters of chaulmoogra oil were used for some cases. Detailed records were kept of the history, symptoms, treatment and progress of each patient. The main drawback of Heiser's treatment is the development of local

abscesses, attributed to the action of resorcin contained in the preparation employed. Persistence in treatment is essential. Thus, one patient on admission showed atrophy of the hands and loss of tactile sense, a macular patch on the forehead, thickening of the ulnar nerve, inguinal adenitis, commencing deformity of the ankles, loss of hair, etc. During the ensuing 18 months he was given 150 injections, and at the time of writing "all has disappeared; the patient has the aspect and sensation of a healthy individual."

H. Harold Scott.

PUBLIC HEALTH REPORTS. 1923. Aug. 10. Vol. 38. No. 32. p. 1817.—**Paroled Lepers from Kalihi Hospital, Hawaii.**

Derivatives of chalmoogra oil have been used since July 1916, and mixed esters since July 1919. Between 1912 and 1917, 34 lepers were paroled, or a yearly average of 5·7, 10 were set free in 1917, while from 1918 to 1922 no less than 193 were paroled, or a yearly average of 48·2. Up to June 30th 1923, 44 paroled cases had returned to hospital, 7 of whom had been paroled again.

L. R.

WADE (H. W.) & BASA (Jose Avellana). **The Culion Leper Colony.**—*Amer. Jl. Trop. Med.* 1923. Sept. Vol. 3. No. 5. pp. 395–416. With 2 plates. [1 ref.], & *Monthly Bull. Philippine Health Service.* 1923. Mar. Vol. 3. No. 3. pp. 93–103.

The interest aroused in the treatment of leprosy by investigators in India and Hawaii led the Philippine authorities to grant appropriations for extending the work to the Culion Colony in 1921, and the work was expanded on the arrival of Governor-General WOOD in 1922. This paper gives an interesting account of the history of the colony as a preliminary to subsequent reports. It is too long to be easily summarized, and should be read by all interested in the subject.

L. R.

i. MARSHALL (Edward R.). **What the United States Public Health Service is doing to prevent the Spread of Leprosy in the Continental United States.**—*Milit. Surgeon.* 1923. Oct. Vol. 53. No. 4. pp. 313–320.

ii. OLIVER (THOMAS). **A Visit to a Leper's Colony.**—*Lancet.* 1924. Jan. 5. p. 57.

i. After two-score years of persistent efforts Congress passed "an act to provide for the care and treatment of persons afflicted with leprosy and to prevent the spread of leprosy in the United States," and provided funds for the purpose, but the difficulty of finding a site was only solved when the Louisiana Leper Home at Carville was taken over in January 1923. It soon contained 172 lepers, 100 more are awaiting accommodation, which is now being supplied, while the total numbers in the United States are estimated at fully 1,000. Comfortable conditions, good treatment, land for cultivation, and amusements are provided, making the settlement a model one.

ii. This paper describes a brief visit to the Carville Colony.

L. R.

MEIRELLES (E.). [**Leprosy in Children.**]—*Arch. Latino-Amer. de Pediatria.* Buenos Aires. 1923. Apr. Vol. 17. p. 250. [Summarized in *Jl. Amer. Med. Assoc.* 1923. Aug. 4. Vol. 81. No. 5. pp. 426–427.]

Of 116 cases of leprosy in children seen in 21 years in Rio de Janeiro only 3 were infants and 6 were between 2 and 6 years of age. All were from contagion, none were congenital cases, which seem to be extremely rare.

L. R.

JEANSELME (M. E.). **Sur un cas de lèpre contractée à Paris.**—*Bull. Acad. Méd.* 1923. Dec. 18. Year 87. Vol. 90. 3rd Ser. No. 43. pp. 595–597. [3 refs.]

A young man developed macular leprosy of a typical and extensive nature with some thickening of the nerves, although he had been born and lived all his life in Paris. His mother was healthy ; his father had served in French Guiana and in Tonkin and Cochin China from 1891 to 1905, but was free from the disease on returning to Paris in the latter year. The son was born in 1907 when his father was still free from signs of leprosy, which first appeared on the face of the father in 1913, eight years after he left the endemic areas of leprosy. Lepra bacilli were found in the nasal mucus of both, and it is extremely probable that the son contracted the disease while living in the house of his affected father in Paris. In spite of the commonly held opinion that the disease is not infectious in the temperate zone, three other cases of apparent infection in non-endemic areas of France have been reported in recent years. The author therefore requested that the permanent leprosy commission of the Academy of Medicine should study the prophylactic measures necessary to prevent the propagation of leprosy in France, as he estimated the number of lepers in Paris at the present time at 150 to 200.

L. R.

FERNANDO (Antonio S.). [In English & Spanish.] **Ocular Manifestations in Leprosy as observed at Culion, P.I. Las manifestaciones oculares en la lepra observadas en Culion, P.I.**—*Jl. Philippine Islands Med. Assoc.* 1923. Sept.-Oct. Vol 3. No. 5. In English. pp. 230–236. With 3 figs. In Spanish. pp. 266–270. [3 refs.]

The author has studied the ocular lesions in the Culion settlement, and points out their occurrence in increasing numbers with duration of the disease, the proportion of such complications in 400 cases varying from 95 per cent. in advanced cases of 15 years' duration to 21 per cent. among those of 8 years' duration. Patients showing involvement of the adnexa, eyebrows and eyelids numbered 178, and of the eye-ball 125, iritis (29) and keratitis (21) being the most common lesions. Blindness of one eye was seen in 23 and in both in 9, with an average duration of leprosy of 14 years. Great care in the administration of chaulmoogrates is necessary when inflammatory eye-symptoms are present for fear of reactions endangering sight.

L. R.

SUGAI (Takekichi). [**Ueber die Lepra der Schleimhaut der Mundhöhle.**] —[Leprous Lesions of the Oral Mucosa.]—*Hifu Hitsunyoki Z.* Tokyo. 1921. Vol. 21. pp. 228–242. [Summarized in *Japan. Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 3. pp. 259–260.]

A study of four lepers showed on the tongue superficial small nodules, in the throat small soft smooth pustules with slight infiltration, and in the nose and larynx as well as in the salivary glands many lepra bacilli. The tonsils were often affected in advanced cases, but the lower part of the trachea and the alimentary canal were always free from lesions.

L. R.

WALKER (Ernest Linwood), MACARTHUR (Charles G.) & SWEENEY (Marion A.). **Second Progress Report on the Investigation of the Chemotherapeutics of Chaulmoogra Oil and its Derivatives in Leprosy and Experimental Tuberculosis.**—*Collected Reprints from the George Williams Hooper Foundation for Medical Research.* No. XVI. 1922–1923. Vol. 7. Reprinted from *Trans. 18th Ann. Meeting Nat. Tuberculosis Assoc.* pp. 553–561. [1 ref.]

This paper records interesting biochemical investigations on the absorption of derivatives of chaulmoogra oil by means of a test the authors devised with the aid of the polariscope, enabling amounts as small as one milligram to be detected in the tissues. They found that butyl and propyl esters were less irritating to the tissues than ethyl esters, and that in whatever form chaulmoogric acids are administered they are metabolized like ordinary fats after the compounds have been hydrolyzed. They are well absorbed from the alimentary tract, but disturb the stomach, and are more quickly absorbed by the intramuscular than by the subcutaneous route, and roughly in proportion to the dose. When injected into the blood they disappear from the circulation in a few minutes and they do not penetrate tubercular tissues in demonstrable amounts, being rapidly oxidized in the system. If repeated large doses are injected, the drug accumulates in the liver. It is more toxic by the intravenous method. The therapeutic experiments on tuberculosis in rabbits are not yet completed, but the present indications are that their action is slight, if any, being less active against the tubercle bacillus in vivo than in vitro.

L. R.

WADE (H. W.). [In English & Spanish.] **Preliminary Notes on Results of Leprosy Treatment at Culion Leper Colony. Notas preliminares sobre los resultados del tratamiento de la lepra en la colonia leprosa de Culion.**—*Jl. Philippine Islands Med. Assoc.* 1923. Sept.-Oct. Vol. 3. No. 5. In English, pp. 236–241. In Spanish, pp. 270–275.

This valuable paper from the Culion Settlement deals with by far the most extensive trial yet carried out of the improved treatment of leprosy. Prior to May 1st 1921 the staff was insufficient to enable any but concurrent affections among the 4,500 lepers to be treated, but it was then strengthened by four physicians, and 500 cases were examined carefully in the next two months as a preliminary to regular treatment. Intravenous injections of ROGERS's preparations were soon dropped owing to vein troubles, and chaulmoogra ethyl esters, plain or iodized, were given intramuscularly. By April 1922 the number had been gradually increased to 1,500 cases, and in the following year to 4,067.

which had been treated for variable periods of time. A survey on September 30th 1923 showed improvement in 55·9 per cent., while in 36 per cent. more the progress of the disease had been checked, 6·4 per cent. were worse, and 1·7 per cent. had died, and under the circumstances "it is felt that this result is far from discouraging." The Mercado-Heiser group gave 37 per cent. improved, plain morrhuic ethyl esters 34 per cent. improved of 44 cases, and the same drug iodized 45 per cent. improved out of 80 cases. Females improved more than males, and the age groups of 20, 40 and 60 years improved more than those of 10, 30 and 50 years of age, especially females of 50, which variations are attributed to the disturbing influence of sexual activity from 20 to 30 and the menopause about 50. Cases of one to two years' duration showed most improvement, after which there was a steady decline. Still more important is the time under treatment as shown in the following figures, which are most encouraging:—

Time under treatment.	Under 3 months.	3–6 months.	6–9 months.	9–12 months.	12–15 months.
Percentage improved	26%	42%	74%	81%	93%

The further progress of this crucial test will be awaited with much interest, as the above results suffice to establish the great advantages of the new principle of injecting soluble products of chaumoogra and other oils.

L. R.

LARA (C. B.). [In English and Spanish.] **Observations on Clinical Aspects of Leprosy Treatment at Culion Leper Colony. Observaciones sobre los aspectos clinicos del tratamiento de la lepra en la colonia leprosa de Culion.**—*Jl. Philippine Islands Med. Assoc.* 1923. Sept.-Oct. Vol. 3. No. 5. In English, pp. 241–247. [5 refs.] In Spanish, pp. 275–280.

This paper deals with the clinical aspects of the Culion treatment and brings out the following points. The intramuscular injections of ethyl ester chaulmoograte were usually given once a week in doses beginning with 0·5 cc., increased by 0·5 cc. at a time up to 4 or 5 cc., reduced or temporarily suspended if much reaction occurs. In early cases the lesions may recede or nearly disappear in about three months; in moderately advanced ones in three to six months, the lesions becoming swollen and inflamed and apparently worse for one to three weeks and then noticeably shrinking, or occasionally ulceration followed by healing may take place. In advanced cases of the nodular or mixed type very little change is usually seen after six months, while not a few appear to be worse. In nerve cases a few show improvement, but advanced cases as a rule remain stationary for months, and the disease may even progress. In some cases the improvement is not sustained. In cases complicated with tuberculosis great caution is required, as in 275 cases all showed symptoms leading to suspension of the drug, while 31 per cent. are believed to have been permanently injured; the symptoms were less under ethyl morrhuate. The deaths from tuberculosis in the colony increased during the past year, but had rapidly increased during recent years, 20 to 30 per cent. of the lepers being tuberculous, while the ratio of deaths from this complication to the total deaths has increased from 1 to 4 in 1915 to 1 to 2 in the first six months of 1922, partly due to better diagnosis, autopsies being done only since 1922. Nephritis also appears to be increasing, especially

due to secondary infections in ulcerated cases. Hookworm disease is also prevalent, and it has not yet been possible to carry out a campaign against it. The author concludes that " both impressions of the staff and patients and the statistical data indicate that the treatment is, on the whole, productive of much benefit, and is distinctly promising in those cases that are not too advanced or are too badly affected by complications for marked or permanent relief to be expected."

L. R.

MUIR (E.), assisted by LANDEMAN (E.), ROY (T. N.) & SANTRA (I.). **The Treatment of Leprosy in the Light of the Nature of its Spread through the Body.**—*Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 543–578. With 14 figs. and 2 charts. [2 refs.]

This valuable paper records Dr. Muir's Calcutta researches on the treatment of leprosy, and brings out clearly the necessity of considerabl experience and careful attention to detail if the best results are to be obtained. The principles underlying the treatment are the necessity of strengthening the body resistance and inducing repeated small reactions due to breaking up and setting free the bacilli in the tissues, which must be carefully controlled to prevent their being excessive, and of avoiding passive congestion in the lesions. A rise of temperature may be beneficial; a case in which the onset of kala azar cleared up the leprotic lesions is mentioned. Exercise strengthens the body, enabling it to destroy the bacilli and assist the cure, and also prevents capillary congestion. Cases complicated with syphilis or with a strong Wassermann reaction should be also treated for this disease, hookworms should be expelled and the general health maintained. Without attention to these points the specific treatment is not nearly so effective.

Ethyl esters prepared from chaulmoogra, hydnocarpus, olive, linseed, cod-liver, neen and gurjum oils have been injected by various routes, the subcutaneous or intramuscular being generally used; the addition of an equal quantity of olive oil greatly diminishes the pain due to those methods of administration, while the addition of 4 per cent. creosote is advised, except when the drug is sterilized in ampoules. Improvement appears to be dependent on obtaining reactions, even if only slight ones, with swelling and softening of the nodules, which in nerve cases may cause severe pain requiring morphia, the benefit appearing to result from the circulation of bacilli or their toxins thus set free. Control injections of creosote and olive oil produced little benefit, showing that the specific effect was due to the ethyl ester hydnocarpate. The use of ethyl esters of linseed and olive oil gave rather better results than those of hydnocarpus and chaulmoogra oils, but the number of cases was too few to establish fully this important point. In eight leper asylums trials of the hydnocarpate esters in 179 cases showed 31 worse, 41 stationary, 48 slightly improved, 58 much improved, and in 3 all signs disappeared, but in many cases the duration of the treatment was insufficient. At Dichpali, where special care was taken, no less than 66 per cent. showed " much improvement " or " all signs disappeared," 12·5 per cent. falling into the latter class, showing the necessity of skilled individual attention. Injections of the hydnocarpate esters into the skin lesions caused the most rapid improvement, which so impressed the patients that they put up with the pain. The first dose by either method should be only 0·25 cc. and it is advisable to take the temperature four times daily, so as to regulate the rapidity

of the increase of the doses by the reactions observed. The drug is injected intramuscularly, and the doses are increased according to the tolerance of the patient, some standing as much as 6 to 7 cc. twice a week. If 2 cc. doses, intramuscularly, fail to produce reactions, divided doses should be injected beneath the lesions, of the skin or nerve, but not into the nerves. If a patient loses weight after reactions stop the drug for one or two weeks. In initial lesions the doses may be rapidly increased, but when there are extensive bacillus-containing lesions greater caution is necessary, so as not to break up and set free too many bacilli at a time. In some cases the injection of a vaccine of Kedrowsky's acid-fast bacillus may be beneficial. Antimony, arsenic and iodides have also been tried, but it is too early to report on them.

The prognosis depends on the age of the patient, his digestive powers, habits regarding exercise, mental attitude and the duration of the disease. Muir concludes that early and persistent treatment arrests the disease and causes gradual disappearance of its signs and symptoms, although he does not consider that a specific cure has yet been discovered; treatment should be continued long after the skin and mucous membranes have become free from bacilli.

L. R.

China Medical Journal. 1923. July. Vol. 37. No. 7. pp. 572–576. With 1 text fig.—**The Treatment of Leprosy by the Infiltration Method.**

This is a reprint of a pamphlet issued by Dr. E. Muir from the Calcutta Leprosy Research Department, describing the method of injecting his E.C.C.O. mixture into the dermal lesions of leprosy. The needle of the syringe is inserted as far as it will go in different directions from punctures made at opposite edges of the patch, and as it is withdrawn drops of the mixture are injected so as to filtrate the loose subcutaneous tissue of the whole patch. This is done twice a week or oftener as long as no marked reaction is produced. The mixture contains 1 to 2 cc. of the ester, 0·5 gram camphor, 0·5 cc. of double distilled creosote, and 3 cc. of olive oil free from fatty acids, the olive oil being sterilized by heating to half an hour on a water bath before being added. The drug is absorbed more rapidly than by ordinary injection, and produces general as well as local improvement; only slight pain at the time of injection results, and the more rapid improvement of the treated areas encourages the patient.

L. R.

Bieling. **Chemotherapie und innere Desinfektion. II. Lepra und Tuberculose.**—*Deut. Med. Woch.* 1923. Sept. 21. Vol. 49. No. 37–38. pp. 1214–1216. [43 refs.]

This paper consists mainly of a theoretical discussion of the principles of chemotherapy as applied to leprosy and tuberculosis, suggested by recent work on the former disease. After referring to the use of "antileprol" by Engel in Cairo in 1909, he goes on to discuss Dean's work on ethyl ester chaulmoogrates and quotes the following interesting figures regarding McDonald's results in the Philippines. Out of 142 cases in which treatment was begun on January 2nd 1918, by October

of the same year 7 had died, while 94 were cured, none of the latter having relapsed in 1921, so that a large number of cases had remained well for 2 to 3 years. The drug was usually well borne, although 10 per cent. could not take the injections regularly. Propyl and butyl esters gave rise to no trouble and the results were equally good.

L. R.

ENGEL (Fr.). **Die Behandlung der Lepra mit dem Äthylester des Chaulmoograöls.**—[Treatment of Leprosy with Ethyl Esters of Chaumoogra Oil.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. July. Vol. 26. No. 6. pp. 161–164. [2 refs.]

With reference to DEAN's work on the use of ethyl ester chaulmoograte in leprosy, it is pointed out that this preparation was formerly made by Bayer's firm under the name of "antileprol" and used with beneficial results in 60 lepers, as reported in 1909 at the Bergen International Leprosy Conference and in subsequent papers.

L. R.

HUIZENGA (Lee S.). **Note on the Treatment of Leprosy.**—*China Med. Jl.* 1923. July. Vol. 37. No. 7. p. 567.

The writer reports favourable results in leprosy with weekly injections of the mixed ethyl esters of chaulmoogra oil made in the Pekin Union Medical College. He points out that a series of patients, who were given plenty of wholesome food in addition to the drug, did better than those treated without that advantage.

L. R.

HAGMAN (G. L.). **On the Treatment of Leprosy with Dean's Derivatives of Chaulmoogra Oil.**—*China Med. Jl.* 1923. July. Vol. 37. No. 7. pp. 568–571.

Six patients undertook to undergo a year's treatment; the one who continued for the full year became clear of symptoms and bacteriologically negative, while improvement was obtained in other cases after shorter courses.

L. R.

TIETZE (Samuel). [In English and Spanish.] **Antileprotic Treatment as instituted at San Lazaro Hospital. Tratamiento antileproso empleado en el hospital de San Lazaro.**—*Jl. Philippine Islands Med. Assoc.* 1923. Sept.-Oct. Vol. 3. No. 5. In English, p. 247. In Spanish, p. 281.

This is a very brief report on treatment at the San Lazaro Hospital of Manilla by ethyl chaulmoograte intramuscularly. Reactions were noted in 10 per cent., encouraged by exercise; 300 cases were treated. No information is given regarding the results obtained.

L. R.

ORTIZ (Pedro N.). **La lepra y su nuevo tratamiento.** [New Methods of Treatment of Leprosy].—*Bull. Porto Rico Med. Assoc.* 1923. Mar. Vol. 17. No. 141. pp. 27–39. With 27 plates.

Intramuscular injections of the ethyl esters of chaulmoogra prepared in the Chemical Laboratory of the University of Hawaii were administered to 40 patients. Nine improved markedly and in three of these all the signs disappeared. Eleven showed slight amelioration only, while thirteen remained in the same condition as at first. Eight of these last were suffering from the nervous type, and it is clear that when there are paralytic lesions and deformities a marked degree of improvement is not to be expected. The disadvantages of these injections are: great pain, severe local reaction leading to the formation of abscesses, and a rise of temperature to 38°–40° C. continuing perhaps for 8 to 12 weeks. In seven of this series the treatment had to be suspended, owing to these causes or to intolerance of the drug, for periods varying from 4 to 29 weeks. If well borne the injections are given in doses of 3 gm. twice a week.

Intravenous injection of the combined ethyl esters was also employed, beginning with 25 cgm. weekly and increasing each time by the same amount to a maximum of 3 gm.; this appeared to be the limit of tolerance. Shivering, rise of temperature, and a troublesome dry cough often followed, the last being prevented by a dose (0·015 gm.) of heroin ten minutes before the injection. Six patients received two doses weekly of 3 gm., and thirteen one dose. The author remarks on the rapid amelioration following this form of treatment and intends to use it more frequently and in larger doses.

H. Harold Scott.

HAMZAH (Mohamad). **Thymol-injecties tegen Lepra.** [Thymol Injections against Leprosy.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 5. pp. 732–733.

This is a short preliminary note recommending intramuscular injections of 10 per cent. thymol in cod-liver oil, 4 cc., every three days at the beginning, later on once a week. The author reports very favourable results of this treatment.

W. J. Bais.

HAMZAH (Mohamad). **Ueber Behandlung der Lepra mit Thymol. Vorläufige Mitteilung.** [Treatment of Leprosy with Thymol. Preliminary Communication.]—*Klin. Woch.* 1923. Oct. 15. Vol. 2. No. 42. p. 1963.

Observations on the treatment of 14 cases of leprosy with thymol 10·0, cod liver oil 90·0 are recorded, 4 cc. being injected intramuscularly every fourth day for the first month, and then once a week. The author was led to try this by using thymol in the place of carbolic acid as an antiseptic added to sodium morrhuate, when he noted definite improvement after two injections, although without the thymol no improvement had taken place, the patient now becoming able to take up work. In other cases the thymol injections were followed by

evident and rapid improvement, the nodules becoming flatter and paler, followed by pigmented scarring, but they eventually became white. In some cases reappearance of the eyebrows and hairs on formerly anaesthetic patches, and regrowth of a finger nail were noted, a claw hand regained power, perforating ulcers healed after two injections, as did those on the legs. A fuller report is promised later.

L. R.

HEGGS (T. Barrett). **A Note on the Treatment of Leprosy.**—*Brit. Med. Jl.* 1923. Dec. 29. pp. 1253–1254.

A nine months' trial of oscol and colloidal antimony at Bagdad is reported in fifteen bacteriologically positive cases, with distinct improvement in most cases up to about three months, when it came to a standstill before the nodules or bacilli had disappeared. Similar temporary improvement followed intravenous injections of chaulmoogra oil and ether. An occasional case improved greatly.

L. R.

NOËL. **Traitement de la lèpre par les sels de terres rares.**—*Ann. de Dermat. et de Syph.* 1922. Oct. 6th. Ser. Vol. 3. No. 10. pp. 475–494.

In view of the reported value in surgical forms of tuberculosis of the salts of rare earths of the group "cerium" prepared in the laboratories of FOURNIER, ROBERT and CARRIÈRE, Noël in Cameroon has tested their value in 7 cases of leprosy by the intravenous method, giving 8 to 10 cgm. doses in a 2 per cent. solution daily for 20 days, repeated with intervals of 15 to 20 days up to six series, in all 120 injections, in the course of eight months. In two cases distinct improvement took place, although far from complete resolution; in 4 the condition remained stationary; while in 1 the lesions increased considerably in spite of the treatment; the results not being satisfactory on the whole.

L. R.

i. PHIPPS (F.). **A propos du traitement de la lèpre par l'Eparseno. Purpura aigu hémorragique provoqué par le traitemente.**—*Maroc.-Médical.* 1923. June 15. No. 18. pp. 176–178. [1 ref.]

ii. DELAMARE (G.) & ACHITOUV. **Lèpre mixte éparsénorésistante.**—*Bull. Acad. Méd.* 1923. Dec. 4. Year 87. Vol. 90. 3rd Ser. No. 41. pp. 488–492. With 1 chart in text.

i. The author reports a case of nodular leprosy in which the use of eparseno, as advised by J. HASSON and by GOUGEROT (this *Bulletin.* Vol. 20, p. 164), not only failed to benefit the disease, but gave rise to a serious intoxication complicated by acute purpura and severe haematemesis.

ii. After referring to the success of HASSON, GOUGEROT, ABERASTURY and BALINA, CHARTRES and ROBINEAU with eparseno in leprosy, and the failures of HUDELO and RICHON, JEANSELME, MARCHOUX and PHIPPS, the author records a case of nodular leprosy in which during two months' treatment with a total of 30 cc. of the drug the reactions obtained were not followed by absorption of the lepromata or other benefit, while the patient lost 10 kilos. in weight.

L. R.

KRAUS (R.). **Beitrag zur Vakzinetherapie der Lepra, Vorgetragen am intern. Leprakongress in Rio de Janeiro.**—*Wien. Klin. Woch.* 1923. Nov. 15. Vol. 36. No. 46. p. 812.

This paper is a preliminary report on a trial of vaccines of Duval's, Devcke's and Kedrowsky's bacilli killed by ether in the treatment of leprosy in South America. Emulsions in physiological salt solution in doses of 50, 100, 500, & 1,000 millions were injected every 4–6 days. Professor SOMMER first used it, but gave it up on account of the severe reactions. During the last year Dr. SCHRODER tried it in the infectious hospital and found the reactions to vary from local inflammation or suppuration, through mere infiltration of the tissues to no reaction at all, while in some there was a rise in temperature. In anaesthetic forms they noted frequent return of sensation, while the bacilli disappeared from the nose, and improvement was noticed in all three types of the disease. Although he is not yet prepared to give a definite opinion, he thinks the method promising. Some other medical men report not unfavourably.

L. R.

WALKER (Ernest Linwood). **Contributions to the Bacteriology of Leprosy. II. The Chromogenic Acid-fast Bacillus of Clegg.**—*Amer. Jl. Trop. Med.* 1923. Sept. Vol. 3. No. 5. pp. 417–424. [9 refs.]

Cultures were first made from swabs of nasal or shin lesions containing many lepra bacilli on Musgrave and Clegg's medium (which, consisting essentially of agar and water, is of very low nutrient value) in symbiosis with amoebae and cholera vibrios. In a small percentage acid-fast bacilli developed after several weeks, and were easily subcultured. Similar results were obtained on the same medium in the absence of the symbiotic organisms, and similar acid-fast bacilli were obtained free from diphtheroids on transplanting from the primary colonies of the pleomorphic partially acid-fast diphtheroid of Bordoni-Uffreduzzi into Musgrave and Clegg's medium, and again on transplanting the smegmal diphtheroid on to the same medium. Further, a non-chromogenic acid-fast bacillus differing from Clegg's bacillus was obtained from non-leprous nasal secretions. The author therefore concludes that Clegg's bacillus appears to be a developmental stage of Bordoni-Uffreduzzi's diphtheroid, but it may possibly be a contamination, and "this organism appears to be identical with or very closely allied to the pleomorphic and facultative acid-fast so-called Bacillus smegatis."

L. R.

TAMIYA (Sadasuke). [**A Morphological and Biological Study of** *Bacillus leprae.*]—*Okayama Ig. Kw. Z.* 1921. pp. 633–662. With 1 plate. [Summarized in *Japan. Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 2. p. 162.]

"The author found that *Bacillus leprae* can be proliferated to a certain extent in the phosphoric acid glycerin broth, when inoculated with small pieces of leprous tissues. The cultured bacilli take certain periodical changes, which can be repeated in the same medium. One course takes about 30 days. The changes are, a large bundle shaped agglomeration of the bacilli as is seen in the initial stage of the culture of tubercle bacilli, which gradually assumes a normal form, and then diphtheroid form, and

then a short wedge-form, and then again assumes a large cluster as in the beginning. During the entire course of the cultivation the bacilli always maintain acid fastness. In a potassium cyanate broth medium, the bacilli assume a remarkable granular appearance, and all the forms, including the granular, that are found in the medium take a deep stain by *Ziel's* solution. The straight granular form will be seen to set free the granules, and the bacillary bodies that had set free those granules contain a vacuole, and present something like a sporogenic form."

L. R.

i. KUJO (Koretake) & CHUMA (Masaru). [**Histologische Studien ueber Lepragewebe mittelst vitaler Färbung.**] [Vital Staining in the Study of Leprous Tissues.]—*Osaka Ig. Kw. Z.* 1921. Vol. 20. pp. 1214–1232. With 1 fig. [Summarized in *Japan. Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 1. pp. 67–68.]

ii. KUJO (Koretake). [**Leprazellen und vitale Färbung.**]—*Tokyo Ij. Shsh.* 1921. pp. 795–802. [Summarized in *Japan. Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 1. p. 68.]

i. Sodium carmine and indian ink were injected into lepra nodules during life. The epithelial cells and the giant cells for the most part did not take up the carmine stain well, although some of the black particles were taken up.

ii. Carmine solutions and trypanblue were injected into the affected skin of a leprous patient and the bacilli proved to be not colourable with very few exceptions.

L. R.

LLOYD (R. B.), MUIR (E.) & MITRA (G. C.). **The Wassermann Reaction in Leprosy.**—*Indian Jl. Med. Res.* 1923. July. Vol. 11. No. 1. pp. 229–233. [1 ref.]

The Leprosy Research Worker and the Serologist of the Calcutta School of Tropical Medicine have taken advantage of their exceptional opportunities to carry out Wassermann tests in 286 cases of undoubted leprosy, with the following results :—

" 1. In a series of 228 adult lepers we find a positive Wassermann Reaction in 41·7 per cent. of all cases, in 27 per cent. of anaesthetic cases, in 47·4 of mixed cases, and in 63 per cent. of nodular cases.

" 2. In a series of 58 leper children we find a positive Wassermann Reaction in 62 per cent. of all cases, in 47 per cent. of anaesthetic cases, in 80 per cent. of mixed cases, and in 100 per cent. of nodular cases, *i.e.*, very much higher figures than in adults.

" 3. A control of 46 untainted children from the same community as (2) above and whose parents or guardians were lepers showed no evidence of a higher positive Wassermann rate than can probably be accounted for by the average syphilis rate."

The authors hope to report later on the influence of treatment on the reaction.

L. R.

LEWIS (Paul A.) & ARONSON (Joseph D.). **The Complement Fixation Reaction as applied to Leprosy.**—*Jl. Experim. Med.* 1923. Aug. 1. Vol. 38. No. 2. pp. 219–232. [57 refs.]

A survey of the literature reveals contradictory results and no satisfactory generalization on this subject, and the writer's work on tuber-

culosis suggests that this is due to modifications of the Wassermann reaction being too closely followed, since they found longer periods than the usual one hour at 37°C. necessary for fixation of acid-fast bacilli. In their experiments they tested 45 sera from 39 lepers, together with a number of non-leprous sera, using as antigens various acid-fast bacilli (including those believed to have been cultivated from lepers by their discoverers), bacillary emulsions, alcoholic extracts, Petroff's antigen and cholesterol, and acetone antigens, with two hours' incubation. *B. leprae* of Clegg, Duval and Kedrowsky, *B. tuberculosis* and Petroff's antigen (T. B.) all gave numerous positive results varying between 81·8 and 96·8, Clegg's bacillus being highest with 93·9 per cent. ; *S. tuberculosis*, with cholesterol and Acetone-insoluble gave 65·9 and 63·6 per cent. of positive reactions. None of the controls sera gave any positive results with Clegg's organism, which may therefore be of practical value in diagnosis, although these reactions are no evidence of any of these bacilli being the cause of leprosy in view of the most frequent reactions being obtained with the tubercle bacillus. Antibody absorption may be demonstrated in the acid-fast group if the absorbing bacteria are removed by filtration.

L. R.

YAGLE (Elizabeth M.) & KOLMER (John A.). **The Kahn Precipitation in Leprosy.**—*Arch. Dermat. & Syph.* 1923. Aug. Vol. 8. No. 2. pp. 183–185. [3 refs.]

The frequent occurrence of positive Wassermann reactions in cases of leprosy led the authors to test whether the serum of lepers, like that of syphilitics, would give positive precipitation or flocculation reactions with alcoholic extracts. They used the Kahn precipitation method (*vide Arch. Dermat. & Syph.*, Sept. 1922). Of 28 leper serums tested, 23 showed no evidence of syphilis and gave negative reaction ; in two with suspicions of syphilis the reaction was doubtful ; and in three having clear evidence of syphilis the reaction was positive. The inference is obvious.

L. R.

i. HERXHEIMER (Gotthold). **Die Lepra und ihre Parallelen zur Tuberkulose.**—*Klin. Woch.* 1923. June 4. Vol. 2. No. 23. pp. 1053–1059.

ii. MARCHOUX (E.). **La lèpre du rat et sa transmission probable à l'homme.**—*Paris Méd.* 1923. Oct. 27. Vol. 13. No. 43. pp. 313–316. With 2 figs. [4 refs.]

iii. NOËL (P.). **Les nouveaux traitements de la lèpre.**—*Ann. de Dermat. et de Syph.* 1922. Dec. 6th Ser. Vol. 3. No. 12. pp. 644–653.

iv. KÄYSER (J. S.). **Verpleging en behandeling van lepralijders.** [Care and Treatment of Lepers.]—*Tijdschr. v. Vergelijkende Geneesk. enz.* Leiden. 1923. July 16. Vol. 9. No. 1–2. pp. 84–105. [English summary, pp. 103–104.] [19 refs.]

i. A general discussion of well known facts.

ii. This deals with work already reviewed in this *Bulletin*, Vol. 29, pp. 825–826.

iii. This paper gives a brief summary of the advances of recent years in the use of soluble preparations of chaulmoogra, cod liver and other oils, without containing any new observations.

iv. In view of the small numbers of lepers in the Netherlands no special measures are required to prevent an increase of the disease, but they should receive the best treatment in a small sanatorium, which should be founded for the purpose.

L. R.

THE BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION (24, Cavendish Square, London, W. 1.).

This Association has been founded in London with the objects set forth in the attached statement, and it is desired to get into touch with all agencies and workers for the relief of leprosy in the Empire. The Association wishes to ascertain what is being done in each country, and how it can best assist such work, with the object of reducing the disease as rapidly as possible by taking full advantage of recent scientific progress, especially as regards improvement in treatment. Readers are therefore asked to send to the Medical Secretary information on the lines of this questionnaire, and so assist the Association in its work.

QUESTIONNAIRE.

(1) Name of country or area dealt with :
- (*a*) Area in square miles
- (*b*) Population by race or religion and its distribution
- (*c*) Climate and other relevant facts

(2) Census or official rate *per mille*. If not available give your own estimate

(3) What legal powers exist as regards :
- (*a*) Compulsory segregation
- (*b*) Prohibition of occupations concerning food, clothing, and domestic service
- (*c*) Are there legal powers to repatriate leper immigrants and those developing it within a given period after arrival
- (*d*) How far are such powers exercised ?

(4) Give for each leper institution :
- (*a*) The accommodation
- (*b*) Aggregate numbers of each of the last three years
- (*c*) The proportion of voluntary admissions
- (*d*) Can cases be detained until non-infective ?
- (*e*) Are members of the family of lepers examined periodically for incipient leprosy ?

(5) What are the rules regarding :
- (*a*) The separation of the sexes
- (*b*) Marriage of lepers of reproductive ages
- (*c*) Cohabitation of married lepers
- (*d*) Separation of lepers' children at birth
- (*e*) Frequency of leprosy in separated children and their age at time of development
- (*f*) Ditto of children living with leper parents
- (*g*) What is the birth rate of married lepers ?

(6) What is the staff of the institution as regards :
- (*a*) Medical qualified men resident and visiting
- (*b*) Nurses or attendants qualified to give remedies hypodermically If not yet available could any be trained for such work ?

(7) What type of buildings are used, and how far are they and the equipment satisfactory ?

(8) What treatments are used, and how long have soluble preparations of chaulmoogra and other oils been injected, and with what results ?

(9) If the improved treatments are not yet in general use would you give them a trial of at least one year if the Association can send supplies and directions for their use ?

(10) Could such treatment be superintended by a competent doctor attending at least once a week and a full report of the trial sent to the Association ?

(11) Are lepers treated at general hospitals, and could separate out-patient leper clinics be established for early cases as has been done successfully in Calcutta ?

(12) In addition to improving treatment, in what ways could the Association best help you ?

(13) Have you any suggestions to make regarding the proposed lines of work of the Association ?

(14) Please supply any additional information of interest regarding the prevalence and modes of spread of leprosy

(15) Do the indigenous population employ any special remedy against leprosy, and if so, can you obtain some for investigation ?

(16) Do you see the Tropical Diseases Bulletin, or would you like to have abstracts of leprosy papers ?

(17) Mention any local customs or conditions affecting leprosy work

(18) How is your area off for hospitals, qualified doctors, and public health activities ?

(19) Please state how you consider the extinction of leprosy could be be effected

(20) What is the prospect in your area of Government and public support for an anti-leprosy campaign ?

(21) Please give other relevant facts, if any, not covered by this questionnaire

The following extracts are taken from the Memorandum of Sir Leonard ROGERS, Medical Secretary, regarding the Medical Policy of the Association.

The objects are—

1. To extend the application of the improved methods of treatment as rapidly as possible throughout the Empire by (*a*) supplying the latest information and the most approved drugs to leper institutions, settlements and hospital clinics ; (*b*) training those in charge of lepers in applying the treatment efficiently.

2. To support sound schemes of segregation, with the best treatment, in countries where the great majority of the lepers can thus be dealt with and the disease rapidly reduced, as in the West Indies, etc.

3. To collect information and statistics and to issue bulletins of information to workers among lepers.

4. To support further researches on both the etiology and treatment of leprosy with a view to discovering more efficient methods of prevention and to further simplify, shorten, and cheapen the curative measures.

CORRIGENDUM.

Dr. R. R. SCOTT, Medical Officer of Health, Dar-es-Salaam, points out that under heading Tanganyika Territory in Vol. 20, No. 6, p. 483, the annual report of the Sanitation Branch of the Medical Department should have been attributed not to him but to Lt.-Col. D. S. SKELTON,

Senior Sanitation Officer. The authorship of the section in question, the leprosy portion of which was summarized, is not stated in the Report.

BABONNEIX (L.) & RIVALIER (E.). **Un cas de lèpre avec syphilis acquise et ectasie de la carotide droite.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1923. June 28. Year 39. 3rd Ser. No. 22. pp. 1004–1008.

BERNUCCI (F.). **Nota sulla alterazioni della innervazione cutanea nelle varie forme di lebbra. (Comunicazione preventiva.)**—*Giorn. Ital. d. Malat. Vener, e d. Pelle.* 1923. May. Year 58. Vol. 64. No. 2. pp. 547–549. [See this *Bulletin*, Vol. 20, p. 824.]

BIEHLER (Ryszard). **Próby szczepienia tradu na kozach. Lepra Impfversuche bei. Ziegen.**—*Przegl. Epidemjol.* Warsaw. 1922. Vol. 2. No. 2. pp. 235–237. With 1 text fig. [German summary p. 238.]

DELAMARE (G.). **Lèpre tubéreuse avec hyperostoses tibiales ; lèpre pachydermique avec glossite scléreuse.**—*Presse Méd.* 1923. June 20. Vol. 31. No. 49. pp. 549–551. With 6 text figs. [6 refs.]

HIRSCHBERG (M.). **Dystrophie adiposogénitale (Syndrome hypophysaire adiposogénital) chez un lépreux.**—*Bull. Soc. Path. Exot.* 1923. Feb. 14. Vol. 16. No. 2. pp. 75–77. With 1 text fig.

HUDELLET (G.). **Lèpre et Aïnhum.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 648–651. With 2 text figs.

METALNIKOV (S.) & TOUMANOFF (K.). **La lèpre chez les Insectes.**—*C. R. Soc. Biol.* 1923. Nov. 10. Vol. 89. No. 31. pp. 935–936.

HELMINTHIASIS.

KENYA. Colony and Protectorate of. **Annual Medical Report for the Year ending 31st December, 1921.** [GILKS (John L.). Principal Medical Officer.] London: Waterlow & Sons, Limited, London Wall. pp. 92; 149–151.

The outstanding point of interest in the helminth infections noted is the discovery of a case of *Sparganum mansoni*. The patient was under treatment at the Native Hospital, Nairobi, and, as in the case of the parasite previously recorded by SAMBON on material collected by Dr. BAXTER, the worm was found in an abscess in the thigh of a Masai.

In 315 stools examined in the laboratory at Nairobi during 1921, the following infections were found:—

Ankylostome ova.	33 cases	10·5 per cent.
Taenia saginata ova.	30 cases	9·5 per cent.
Trichuris trichiura.	26 cases	8·3 per cent.
Ascaris lumbricoides.	12 cases	3·8 per cent.
Strongyloides stercoralis.	10 cases	3·2 per cent.
Schistosoma mansoni.	9 cases	2·9 per cent.

Although as compared with the figures of the previous three years the actual number of cases of *Schistosoma mansoni* had decreased, the percentage had risen from 1·8 per cent. in 1919 and 2·4 per cent. in 1920 to 2·9 per cent. in 1921. Rectal bilharziosis is much more common in Kenya than the urinary type.*

R. T. Leiper.

MCCONNELL (R. E.). **A Report on Helminthiasis in the West Nile District.**—*Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1922.* pp. 61–66.

The primary purpose of the report is to draw attention to the presence of ankylostomiasis and bilharziasis in the West Nile District of the Uganda Protectorate. Of 100 natives 99 harboured *Necator americanus*. *Strongyloides intestinalis* is also reported for this province apparently for the first time. In four cases small nematodes were found (1) 2·63 cm. long by 55 mm. wide, white with fine transverse cuticular striations and a pair of anterior and posterior cuticular alae. (2) 6·2 cm. long, white, with lateral cuticular ridges and a three lipped mouth. (3) Three worms, one being 4 cm. long, with numerous papillae on the tail, possibly a young *Ascaris lumbricoides* and the other two 3 cm. by 0·64 mm. and 2·8 cm. by 0·53 mm. white. (4) Two worms of different species, one with cephalic papillae and corona radiata and the vagina near the anus, the other 1·1 cm. long, cylindroid with a trilobed ribbed bursa and a mouth of ankylostomoid type. The bilharziasis cases were chiefly of *S. mansoni* type, the ova being found in 7 out of 100 unsuspected cases. Four other cases were detected among 22 patients who complained of abdominal troubles and of whom 21 harboured hookworms.

R. T. L.

* [Dr. G. V. ALLEN, who was in part responsible for the work recorded in this report, says, in a personal communication, that the urinary type has since been found to be common among the Coast natives. Ed.]

HODSON (Vincent S.). **Intestinal Parasites in the Sudan.**—*Jl. Trop. Med. & Hyg.* 1923. July 16. Vol. 26. No. 14. pp. 244–245. [1 ref.]

In order to obtain a record of the prevalence of intestinal parasites in the Sudan the author has for some years had routine examinations carried out on the faeces of patients at the Khartoum Civil Hospital, and of boys at the Gordon College and the Omdurman School. The percentage infected was found to be in the neighbourhood of 40 for the year 1922. At the hospital ankylostomes were most frequently met with (in 48 per cent.), but amongst the boys at both schools *Taenia nana*.

Among the examples of multiple infection is mentioned a patient with malaria, relapsing fever, hookworm, *Taenia saginata*, *S. haematobium* and *S. mansoni*. This man had, incidentally, been admitted for a crushed foot.

H. Harold Scott.

FAUST (Ernest Carroll). **Practical Parasitology in South China.**—*Jl. Trop. Med. & Hyg.* 1923. Sept. 1. Vol. 26. No. 17. pp. 273–275.

Noso-geographically China is divisible into two areas, one, lying to the north of the Hwai River basin, constituting a dry northern region of slight infection, and one embracing the warm moist areas of Central and South China and constituting a region of heavy infectivity. In the latter area cestode infections are of only minor importance as contrasted with Clonorchiasis, Schistosomiasis, Ankylostomiasis, Ascariasis, Trichuriasis and Filariasis. Clonorchiasis is a very heavy infection among the population in the Pearl River Delta. Fasciolopsis is of clinical importance in the Kwangtung Province, as is also the oriental blood fluke. The intermediate host of *S. japonicum* has been found in the region of Fatshan in the Canton area. The author emphasizes the necessity of studying the customs of the people and the soil conditions in order to establish effective barriers against infection.

R. T. L.

WOLFF (J. W.). **Statistische gegevens omtrent eenige worminfecties der bevolking te Paramaribo.** [Helminth Infections at Paramaribo.] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 3. pp.373–391. English Summary p. 390. With 6 figs. [15 refs.]

The author describes the arrangements at Paramaribo [Dutch Guiana] for the dispensary treatment of hookworm patients. Examination showed that ankylostome infection among British-Indians was very high, 96 per cent. This is ascribed to the fact that they have their own plots of ground which they cultivate and constantly subject to infection. Treatment of patients was of very little use unless combined with hygienic measures applied to their dwellings, yards, and outhouses.

Ascaris infection, on the other hand, is comparatively low (35 per cent.) as compared with 76 per cent. amongst the negroes and 58 per cent amongst the Creole population. It is suggested that the onions, garlic and other herbs which enter largely into the diet of the British-Indians act as vermifuges.

1,500 persons were examined for evidence of schistosomiasis. 7·4 per cent. of the British-Indians, 3·9 per cent. of the Creoles, and 1·6 per cent. of the negroes were found to be infected with *S. mansoni*.

H. H. S.

DE ALMEIDA (Junior) (A.). **As Verminoses nas escolas.** [Helminthiasis in Schools.]—*Ann. Paulist. Med. e Cirurg.* 1923. Sept. Year 11. Vol. 14. No. 9. pp. 87–92. With 1 fig.

Examination of the faeces of school-children of S. Paulo shows that in urban districts Ascaris and Trichuris predominate, Oxyuris being also found in considerable numbers. In rural districts Ankylostomes are present in addition.

Of 883 children below 12 years of age in Capital do Amazonas 635 (71·9 per cent.) harboured worms of some kind—Necator 95·2, Trichuris 82·3, Ascaris 52·2, Oxyuris 30·2, Eustrongyloides 23·9 per cent. In Barra Funda of 1,177 school-children 91·6 per cent. were positive—Trichuris 71, Ascaris 47·9, Ankylostomes 11·8, Hymenolepis 10·1, *Taenia saginata* 1·9, Oxyuris 1·7, Eustrongyloides 0·84 per cent.

[Presumably *Eustrongyloides* is used in this paper for the genus *Strongyloides*.]

In a third group 687 were examined, and of these 459 (66·81 per cent.) were positive and the following were the proportions in which ova were found: Ascaris 39·44, Trichuris 34·7, Hymenolepis 7·86, Ankylostomes 1·89, Oxyuris 0·72 per cent.

The number of boys infected was slightly greater than that of the girls in the last group—67·91 as against 65·99. The length of stay at the school did not affect the percentages to any marked extent; thus the figures given for the first four years are respectively 71·17, 67·90, 62·79 and 71·60 per cent.

Combining the returns from the various schools of the Capital the general rate of infection appears to be about 60 per cent.

H. H. S.

HÄRLE (A.), STÜTTERLIN (Th.) & ZEISS (H.). **Helminthologische Untersuchungen an Moskauer Kindern.**—*Ztschr. f. Hyg. u. Infektionskr.* 1923. July 6. Vol. 100. No. 2. pp. 140–154. [19 refs.]

The authors examined the faeces of 878 children in Moscow and found 437 (49·8 per cent.) infected with worms of one kind or another. The advantage of FÜLLEBORN'S enrichment method with concentrated salt solution over direct examination is shown, the former giving 15 to 25 per cent. more positive results. Ascaris proved to be the predominant infection at all ages.

Investigations were carried out as regards the blood changes set up. Strange to say the haemoglobin percentages were not found to differ in the worm-infected children from those in the non-infected. The eosinophile percentage is, in the authors' opinion, of no diagnostic value. Counts ranging between 7 and 33 per cent. were met with in children in whom there were no indications of the presence of worms, and it is suggested that these high figures are ascribable to defective nutrition, toxins, or the after-effects of infectious fevers.

H. H. S.

BRÜNING (Hermann). **Wurmkuren bei Kindern, ihre Gefahren und Verhütung. (Mitbesonderer Berücksichtigung des amerikanischen Wurmsamenöles).**—[The Dangers of Worm Cures in Children with Special Reference to Chenopodium.]—*Deut. Med. Woch.* 1923. Dec. 7. Vol. 49. No. 49. pp. 1492–1494.. [4 refs.]

The author relates some unfortunate experiences with oil of chenopodium. Of five cases recorded four of the patients died, while the fifth suffered from disturbances of hearing for more than six months afterwards. It is hardly fair, however, to speak of this as a mortality of 80 per cent. The doses appear to have been unduly large, for a child of 5 years was given three doses of 20 drops, and in some of the cases castor oil was administered as an aperient, and in another cod-liver oil was prescribed in addition. In one case a single ascaris was expelled; none of the others passed any worms at all, nor were any found at the autopsies.

To avoid the dangers it is recommended that the diagnosis of the presence of worms should be definitely made and the drug not given merely on suspicion; that, unless the patient is otherwise in good health, oil of chenopodium is better avoided; that it should not be accompanied or followed by castor-oil, cod-liver oil, or any such, and finally, that the dosage should be carefully graded according to the age of the child. [The question of the employment of a preparation standardized as to its Ascaridol content is not mentioned.]

H. H. S.

MARCHAND (L.) **Convulsions vermineuses et épilepsie.**—*Gaz. des Hôpit.* 1923. Aug. 2 & 4. Vol. 96. No. 62. pp. 993–995. [37 refs.]

A brief but interesting paper discussing the relation between convulsions due to helminth infection and epilepsy. After pointing out the fallacies, on the one hand, of ascribing epileptiform attacks to worms merely because ova are seen in the faeces, and, on the other, of ruling out helminths as a cause because the symptoms continue after expulsion of the worms, he shows how, in a child with an unstable nervous system, irritation of the intestinal mucosa by movements of ascarides and taeniae, or absorption of toxins produced by them, or, in the case of oxyurides, pruritus, may cause convulsions, but that these will disappear with removal of the worms. Apart from this, however, he thinks that helminth toxins on reaching the brain may set up definite meningeal reactions with lymphocytosis, adhesions, and foci of cortical sclerosis, which may cause true epilepsy subsequently.

H. H. S.

FÜLLEBORN (F.). **Ueber Tetrachlorkohlenstoff als Antihelminthikum.** [Carbon Tetrachloride as Anthelmintic].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Aug. Vol. 27. No. 8. pp. 280–286. [4 refs.]

This paper, though bringing forward no new points, gives a good account of the use of carbon tetrachloride in helminthic infections. Special attention is drawn to the following facts:—It is the best drug known against hookworm; it is harmless even for children and pregnant women, unless impurities are present; no preliminary treatment, dietetic or otherwise, is necessary; since in most cases only a single dose is needed it is a good drug to use for mass-treatment; it is cheap. Though not very effectual against ascaris when used alone it may be made so by the addition of oil of chenopodium, 1 part to 11 of carbon

tetrachloride, the dose being 0·2 cc. for each year of age. It is powerless against Strongyloides and only active for Taenia when combined with thymol.

H. H. S.

DOCHERTY (J. F.) & NICHOLLS (Lucius). **Report of Three Autopsies following Carbon Tetrachloride Treatment.**—*Brit. Med. Jl.* 1923. Oct. 27. p. 753. [1 ref.]

From a study of the tissues of three condemned prisoners who had received 4 cc. of carbon tetrachloride the authors conclude that the drug may produce fatty degeneration of the liver, but that these changes are of a temporary character and do not appear to contra-indicate the use of the drug, for many patients have been treated with much larger doses and have not complained of symptoms other than very slight giddiness; of many hundreds of school children who have received this treatment none have had any sign of ill-health. In some of the cases the changes in the liver were so marked that signs of marked ill-health during life should have been expected, but these were absent; consequently it is inferred that much fat, presumably from fatty degeneration, may appear in the liver and yet be of small importance clinically.

R. T. L.

MOLLOY (Daniel M.). **Notes on the Pharmacology and Therapeutics of Oil of Chenopodium and Investigations on the Anthelmintic Value of its Components.**—*Jl. Pharm. & Experim. Therap.* 1923. July. Vol. 21. No. 6. pp. 391–400. 10 refs.

HALL and HAMILTON having stated that the chief anthelminthic principles resided in the lighter (or terpene) fraction distilled from oil of chenopodium while the heavier (ascaridole-containing) fraction was not only less potent but contained also the toxic and irritant constituents, the author carried out tests on prisoners at the Nicaraguan Penitentiary and shows that this paradoxical state of things was not confirmed. He found that the terpene fraction, which constitutes about 40 per cent. of the whole oil, has no anthelminthic action but that the efficiency rests entirely on the ascaridole fraction, representing 57 per cent. of the oil, 98 per cent. of worms being expelled by its use. This part, however, contains also the toxic principles of the drug, and these cannot be separated. In view of the variability of oil of chenopodium in anthelminthic properties the author suggests that the drug should be standardized to obtain ascaridole of constant boiling point, which could easily be done by fractional distillation. The paper is a valuable contribution to the question of hookworm therapy.

H. H. S.

BRUMPT (E.). **Utilisation de l'antiformine pour l'épuration des selles destinées à la culture de certains œufs d'helminthes.**—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Aug. Vol. 1. No. 3. p. 301.

Antiformin has been utilized by YAOITA and by MACNEIL, in association with ether, for the concentration of eggs of helminths from the faeces. The author has found a technique which he has successfully applied to the faeces of a fox which contained ascarids and trichosomes.

The stool, placed in a conical vessel, is shaken in a mixer with a smaller volume of antiformin for some minutes. The mixture is then diluted in 20 to 30 times its volume of water and passed through a fine sieve. The sediment collected by decanting or centrifuging is placed in flat bottomed vials containing 1 per cent. formol. After 4 days in an incubator at 30° the ascarid eggs were found to contain mobile embryos and the trichosome eggs contained morulae.

R. T. L.

MORENAS (L.). [**L'Anaphylaxie dans les Helminthiases intestinales.**]—*Jl. Méd. de Lyon.* 1922. Dec. 20. No. 71. pp. 773–780. [Summarized in *Arch. f, Schiffs- u. Trop.-Hyg.* 1923. Aug. Vol. 27. No. 8. p. 295.]

This paper summarizes the anaphylactic symptoms resulting from experimental injection of extracts of ascaris and of hydatid fluid. The author is of opinion that several of the clinical signs occurring in helminth infection are anaphylactic in nature.

H. H. S.

STUNKARD (Horace W.). **Studies on North American Blood Flukes.**—*Bull. of the Amer. Museum of Natural History*, New York. 1923. Oct. 8. Vol. 48. Art. 7. pp. 165–221. With 13 plates.

The blood-infesting trematodes comprise the three families, *Schistosomidae, Spirorchidae* and *Aporocotylidae.* Of these the first is unisexual, the others hermaphrodite. This monograph, which gives a valuable résumé of these families and discusses the relationships and origin of the various groups, is of medical interest in so far as it revises somewhat the views regarding the origin of the schistosome worms of man and mammals put forward by ODHNER (1912) [see this *Bulletin*, Vol. 21, p. 180]. Certain morphological characters are common throughout the group, but within the families and genera there are great morphological disparities. Those parasitic in fish are without organs of adhesion ; among the parasites in the turtle one group has only an oral sucker, the other has both oral and ventral suckers. In the family *Schistosomidae* there are genera with no suckers and others with two. Other diversities are quoted, and probably no other trematode group manifests such unusual and unexplainable differences. The author, however, feels justified in regarding these as closely related and considers their evolution to have proceeded from the type of *Sanguinicola* and *Aporocotyle* through *Spirorchis* and *Hapalotrema* to the Schistosomes.

R. T. L.

MAPLESTONE (P. A.). **A Revision of the *Amphistomata* of Mammals.**—*Ann. Trop. Med. & Parasit.* 1923. July 12. Vol. 17. No. 2. pp. 113–212. With 4 plates & 32 text figs. [28 refs.] [Human Parasites pp. 164–5 ; 193–5.]

The Amphistomes are represented in man by only two species, *Gastrodiscoides hominis* and *Watsonius watsoni*, but they are a large widespread and important group of flukes, many species of which are of importance to the veterinarian in the tropics. In this critical review of the whole group the author has removed much of the confusion due to an unnecessary multiplicity of genera and has now made the identification of species found a relatively straightforward matter. The author's own studies on hundreds of specimens has contributed much to the elucidation of many obscure problems in specific relationships. In his dealing with the species which infect man the author accepts Gastrodiscoides as a valid genus, although the generic definition must be emended for the presence of a genital papilla or a genital atrium is a matter of chance [? or preservation] and cannot in his opinion be accepted as of diagnostic value. Of greater inter-

est are his conclusions on the systematic position of *Watsonius watsoni*. He is led by a comparison of STILES and GOLDBERGER's description of *Pseudodiscus hawkesi* with this species to conclude that the two worms are practically identical, except in size which may be attributable to age, and he expresses the view that they are actually identical, but in the absence of material, and as one has man as a host and the other the elephant, he does not feel justified in merging them, but he places them in the same genus, *Watsonius* becoming a synonym of *Pseudodiscus* on grounds of priority.

R. T. L.

BARLOW (Claude H.). **Life Cycle of** *Fasciolopsis buski* **(Human) in China.**—*China Med. Jl.* 1923. June. Vol. 37. No. 6. pp. 453–472. With 1 plate and 7 figs. [2 refs.]

The paper gives a useful résumé of present day knowledge of *Fasciolopsis buski* and of recent work on its life cycle and mode of spread. Cases in Shaohsing, the reputed centre of this infection in China, came chiefly from the north of the city and almost none from the south. The villages Entsong and Siaosan appear to be the most intensely infested. The life cycle has been worked out by NAKAGAWA (1920) in North Formosa, but important facts have been discovered by the author, such as the actual source of human infection. He finds that the Chinese acquire this from eating the water-caltrop (*Trapa natans*). The red water-caltrop is particularly implicated. As many as 40 encysted cercariae have been found on one nut of this species and an average of 17·9 cysts were noted on nuts gathered from the same field. Every nut examined showed some infection. Careful notes are given of the results of self infection experimentally undertaken by the author. Charts give the growth record and measurements of 3,721 flukes passed by a naturally infected patient. Compared with the results obtained by NAKAGAWA in the pig it would appear that Fasciolopsis grows larger and matures more rapidly in man. The largest worms found were 3½ in.–4 in. long, but it would appear that the size is simply determined by the length of time the worm can remain in a locality favourable to its growth, and the author sees no reason to depart from his adhesion to the view that one species occurs in man. On the other hand, he has never seen a case of infestation in the pig in these heavily infected areas, and in Yungchun Fukien, where the pigs are heavily infected, he did not find a single human case.

The subject calls for further investigation.

R. T. L.

KOO (U. K.). **Paragonimiasis with Report of a Case.**—*Nat. Med. Jl. China.* 1922. Dec. Vol. 8. No. 4. pp. 259–263. With 1 text fig. [4 refs.]

A typical case of Paragonimus infection, which was not diagnosed for some time because only stained smears were examined and not the fresh sputum nor, apparently, the faeces. This is the first case observed in St. Luke's Hospital, Shanghai. The infection was probably contracted in Korea.

H. H. S.

CAWSTON (F. G.). **Possible Presence of Paragonimiasis amongst Indians in Natal.**—*Jl. Trop. Med. & Hyg.* 1923. Aug. 15. Vol. 26. No. 16. pp. 263–264.

There is not the slightest evidence, even granting the occurrence of styletted cercariae in the local molluscs, that the Paragonimus occurs either in Indians or in Africans in Natal. The paper deals with preventive measures to meet a purely hypothetical situation.

R. T. L.

GEHRINGER (George M.). *Clonorchis sinensis* **in Panama.**—*Proc. Med. Assoc. Isthmian Canal Zone.* 1920. Jan.-Dec. Vol. 13. Pts. 1 & 2. pp. 103-106.

The pathological conditions in the liver in three Chinese patients with Clonorchis infection are described, and the author expresses the fear that, since "*Limnaeus minutus*" clings to vegetables and water cress, infection may spread in Panama. The changes in the liver were such as are usually associated with this condition, but, in view of the work of MUTO, KOBAYASHI and others on the life-history of *Clonorchis sinensis*, the fears of spread without the intervention of the second (fish) host would appear to be groundless. None but Chinese were found infected, and they were probably all introduced cases.

H. H. S.

SHATTUCK (George Cheever). **Clonorchiasis in Boston.**—*Boston Med. & Surg. Jl.* 1923. Aug. 2. Vol. 189. No: 5. pp. 165–166. [2 refs.]

So far as the author has been able to ascertain no case of clonorchiasis has yet been reported from the New England States and the 54 cases, which he mentions as seen in Boston during the past 16 months occurred in Japanese and were obviously exotic infections. Only two cases are briefly described and contained little of interest.

R. T. L.

KUWABARA (Shosaburo) & MUTŌ (Masatomo). [**Is Immunization possible in Liver Distomiasis?**]—*Chuo. Ig. Kw. Z. Nagoya.* 1921. pp. 34-45. [Summarized in *Japan. Jl. Med. Sci.* Tokyo. 1922. Vol. 1. No. 2. p. 145.]

A positive reaction was obtained in the complement fixation tests made upon human cases of liver distomiasis of long standing, but the test was negative in a case of recent infection. In a dog kept for two years and eleven months after artificial infection with liver flukes [*Clonorchis* presumably] a positive immunological reaction was obtained. The immunological reaction was found to have no connexion with jaundice, ankylostomiasis, ascariasis and oxyuriasis, but was specific to liver distomiasis. The author concludes that immunization is possible in liver distomiasis.

R. T. L.

REYNAUD (G.). & LÉGER (M.). **Les bilharzioses ou schistosomoses dans les colonies françaises. Géographie médicale.—Epidémiologie.—Traitement.**—*Congrès de la Santé Publique et de la Prévoyance Sociale, Marseille, 11–17 Septembre, 1922. Rapports.* pp. 25–46. [67 refs.]

This report summarizes our knowledge of the geographical distribution of bilharziasis in the French Colonies, the recent work upon the life history of *S. haematobium* and *S. mansoni* and the treatment of these infestations by tartar emetic, etc. There is an extensive bibliography. The only new observations reported concern the incidence of *S. mansoni*, which according to M. Léger occurs in from 8 to 10 per cent. of the population of Guadeloupe and Martinique, whereas in Guiana [presumably French Guiana] it is only 2 per cent.

R. T. L.

CHRISTOPHERSON (J. B.). **Intermediary Hosts of** *Schistosoma haematobium* **and** *mansoni* **in Nyasaland.** [Correspondence.]—*Brit. Med. Jl.* 1923. Sept. 8. p. 437.

The freshwater molluscs found in the Karonga district of Nyasaland belong to 5 species :—*Lanestes affinis, Vivipara robertsoni, Limnaea natalensis, Physopsis* sc. *globosa*, and *Planorbis* sp. near *sudanicus*. Certain preliminary experiments made by Capt. W. H. DYE appear to lead Christopherson to infer that of these molluscs the carrier of *S. haematobium* is probably *P. globosa* and of *S. mansoni* the *Planorbis* sp., for these alone show attraction to the miracidia.

R. T. L.

CLAPIER (P.). *Schistosomum haematobium* **à Libreville (Gabon).**—*Bull. Soc. Path. Exot.* 1923. July 11. Vol. 16. No. 7. pp. 559–564. [2 refs.]

Schistosomiasis is not common in Libreville, and most of those infected have brought the disease with them. Thus, amongst 154 soldiers 7 were found all of whom had probably been infected in childhood before coming to the district. Two others, however, exhibiting rectal infection with *S. haematobium*—there were no urinary symptoms—were indigenous. The source whence these were infected is not known, as the search for mollusc hosts in these parts has not yet been undertaken. The author speaks highly of the efficacy of emetine intravenously.

H. H. S.

CHARRIER (H.). **Au sujet de la Bilharziose au Portugal et au Maroc.**—*Bull. Soc. Path. Exot.* 1923. July 11. Vol. 16. No. 7. pp. 491–494. [6 refs.]

Schistosomiasis made its appearance in Portugal in 1918, and was thought to have been brought thither by fishermen from Tangier. Fishing operations had been started there in 1914, but abandoned, owing to the outbreak of war, and restarted in 1918. Enquiries, however, revealed the fact that the disease is not known at Tangier either amongst Europeans or the indigenous population. *Bullinus contortus*, the intermediate host of schistosomiasis in Marrakech or its neighbourhood, and *Planorbis dufourii* (the vector in Portugal) are found in the northern part of Morocco, but examination of large numbers failed to yield any cercariae. The source whence Portugal became infected is, therefore, still undecided.

H. H. S.

ANDERSON (Charles W.). **Enquête et recherches sur la bilharziose en Tunisie.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1923. Feb. Vol. 3. No. 1. pp. 3–21. With 3 plates, 6 figs. & 2 maps. [15 refs.]

The author has made a survey in Tunis of the incidence of bilharziasis and its reputed carriers. The genus *Planorbis* is represented by the species *Planorbis philippii* var. *subangulatus*, and this is limited to the Northern region between 37°21 N. and 36°23 N. The most important focus is Oued Bezirck. *S. mansoni*, however, does not occur in the whole Regency, and the distribution of this species of Planorbis cannot be correlated with schistosome infection. The genus *Bullinus* is

widely distributed, and the occurrence of specimens of this genus coincides with cases of *S. haematobium*. Three species were encountered, *viz.*, *Bullinus contortus*, *B. brochii*, and *B. dybowski*. *B. contortus* was noted especially at Tabarca, Oued-Bezirck, Kairouan, Nefzaoua (Tombar, Rhamat, Djemana, Bazma, El-Goléa). *B. brochii* has an endemic focus at Gafsa and *B. dybowski* at Degache. A useful map indicates the localities visited. The paper gives some observations on the egg laying and bionomics of Bullinus and concludes with notes on attempts to infect various fresh-water snails, none of which showed any specific attraction for the miracidia of *S. haematobium*.

R. T. L.

CAWSTON (F. G.). **Schistosoma Infestation.** [Correspondence.]—*Brit. Med. Jl.* 1923. Sept. 8. p. 437.

The author has noticed slight manifestations of *Schistosoma mansoni* in two patients in Natal who have never left the country, and in both cases complicating infection with *S. haematobium*. The finding of *Segmentina kanisaensis*, Preston, at Merebank, Natal, is considered [without much justification] to support the assumption that *S. mansoni* has been introduced from Egypt, for the shell [which apparently has not been proved anywhere a carrier] was previously only known from the Upper Nile. In the author's own case of accidental infection with bilharziasis the eosinophilia rose to 39·9 per cent. during the hepatic invasion with the fluke and fell to 12 per cent. in the succeeding few months without treatment.

Commenting on a recent paper by SINDERSON and MILLS on rectal papillomata (see this *Bulletin*, Vol. 20, p. 941) in a case in the Baghdad Hospital the writer regrets that intravenous antimony was not employed before the surgical measures were undertaken, for extensive bilharzia tissue rapidly subsides after the adults and their eggs have been destroyed by this injection.

R. T. L.

CARDOSO (Eleyson). **Contribuição ao estudo da schistosomose no Estado de Sergipe.**—*Brazil-Medico.* 1923. Oct. 30. Year 37. Vol. 2. No. 16. pp. 239–240.

The author investigated various districts of the State of Sergipe with a view to ascertaining the prevalence of schistosomiasis among the population by faecal examination and that of Planorbis by examining collections of water for snails. In Estamia and Santa Lazia a few cases were seen but no mollusca obtained; in Aracajú 449 cases were met with, and in all but three other parasites were present also, notably hookworms. 263 of the patients were females, 186 males. The higher incidence among the former is attributed to their standing in the water-pools washing clothes. *Planorbis centrimetralis* was the common intermediate host. Where the water supply would not be too reduced thereby the author recommends filling in some of the ponds; otherwise the preventive measures brought forward are on the usual lines—boiling the water for drinking, preventing the passage of excreta into the streams, treating cases with antimony, and so forth.

H. H. S.

IBRAHIM, ALY BEY. **Bilharziasis of the Ureter.**—*Lancet.* 1923. Dec. 1. pp. 1184–1186. With 3 figs. [12 refs.]

Bilharziasis of the ureters is a far less widely recognized affection than bilharziasis of the bladder and is much more dangerous and intractable. Typical cases of renal colic have frequently puzzled surgeons practising in Egypt, for the presence of stone was not revealed by the most careful radiographs. Probably nine out of ten of these are attributable to ureteral bilharziasis. The same lesions explain most cases of hydronephronsis.

Now that bilharziasis can be successfully treated with tartar emetic, the outlook is hopeful provided cases are recognized early. The disease passes through three fairly definite pathological phases, each of which gives a different clinical picture.—STAGE I. *Infiltration with ova*, manifested by (a) sandy patches, (b) sessile infiltrations, (c) papillomata. The mucosa is still intact and the muscular wall in good condition. The kidney appears normal. STAGE II. *Ulceration and fibrosis.* This follows necrosis of the mucosa. The muscular wall atrophies. There is a narrowing and subsequent dilatation of the ureter above this point. The kidney suffers from pressure atrophy. STAGE III. *Cicatrization, stricture and obliteration.* The lumen becomes obliterated and replaced by a solid fibrous cord. The upper part of the ureter and the pelvis of the kidney become dilated. Eventually the kidney becomes a fibrous sac containing urine or pus. The clinical signs and symptoms accompanying these stages are illustrated by a series of clinical notes of eleven cases.

R. T. L.

PFISTER (E.). **Die Ovispermia Bilharzica (Eiersamen bei Bilharziakrankheit.**—*Zeitsch f. Urol.* Leipzig. 1922. Vol. 16. No. 11. pp. 488–489. [4 refs.]

The frequency and prevalence of oöspermia (the presence of schistosoma eggs in the spermatic fluid) is not an easy matter to determine, but that it does occur and may be an early symptom, even preceding the haematuria, was shown by MADDEN in 1911. The author states that the ova may come from any part of the genital system, the prostate, spermatic cord, testis, epididymis, urethral glands and seminal vesicles, and not from the last named only as has been hitherto believed.

H. H. S.

PFISTER (E.). **Die orchitis bilharzica.**—*Ztschr. f. Urol.* 1922. Vol. 16. No. 1. pp. 16–18. With 1 text fig.

Apropos of a patient under the author's care who presented an orchitis with a fistula discharging schistosoma eggs, the question of the mode of origin of this condition is considered. The orchitis may occur without any affection of the tunica vaginalis, and it is suggested that bilharzial orchitis and epididymitis may arise either directly by penetration or embolism of ova in the parenchyma of the organ, subsequent inflammation giving a picture resembling a tuberculous condition with or without fistula, or indirectly by passage along the vasa deferentia.

H. H. S.

BRUSSET & BUROLLET (P. A.). **Quelques réflexions au sujet d'un cas de bilharziose.**—*Arch. Méd. et Pharm. Milit.* 1923. Mar. Vol. 78. No. 3. pp. 287–289.

A brief account is given of a patient suffering from haematuria and pyuria, whose disease had been diagnosed, after cystoscopic examination, as tuberculous cystitis, although the bacilli were not found in the urine nor were any physical signs of tuberculosis detected elsewhere. The urine contained ova of *Sch. haematobium* in large numbers. One is left in doubt whether tuberculous disease was actually present in addition to the schistosomiasis.]

H. H. S.

ARANTES (Antonio). **Sobre dois casos de Schistosomose autochtones em Santos. (Nota previa.)** [Two cases of Schistosomiasis originating in Santos.]—*Ann. Paulist. Med. e Cirurg.* 1923. Sept. Year 11. Vol. 14. No. 9. pp. 95–96.

Two cases of schistosomiasis are recorded as having originated in Santos. Both were children, aged 7 and 8 years respectively, and the ova of *S. mansoni* were found in the stools. Neither patient exhibited any of the usual symptoms of schistosome infection. Search for the intermediate host was at first unsuccessful, but subsequently a Planorbis was discovered, probably *P. centrimetralis*. The first patient was treated with emetine and the ova disappeared. Nothing further is stated as regards the second case.

H. H. S.

JONES (S. B.). **Intestinal Bilharziasis in the West Indies: Intermediate Host.**—*Jl. Trop. Med. & Hyg.* 1923. Aug. 1. Vol. 26. No. 15. pp. 253–254.

Intestinal bilharziasis occurs in the white and black inhabitants of the West Indies, and is present in Guadeloupe, French St. Martin, St. Kitts, probably Antigua, and in Santo Domingo and Porto Rico. The mollusc which prevails and is apparently the intermediate host in French St. Martin is *Planorbis antiguensis*, Reeve. This is probably also the carrier in St. Kitts and in Antigua. In the latter island myriads of Planorbis were found at Body Pond's Dam, the reservoir of the city of St. John's. [The author paints a somewhat lurid picture of the tragic possibilities of the spread of the infection which he regards with unnecessary pessimism.]

R. T. L.

MELENEY (Henry Edmund) & FAUST (Ernest Carroll). **The Intermediate Host of *Schistosoma japonicum*; I. Its Discovery in the Soochow Region. II. Its Distribution in China.**—*China Med. Jl.* 1923. July. Vol. 37. No. 7. pp. 541–554. With 7 figs. [9 refs.]

I. In the region North of Soochow, known to be an endemic focus of schistosomiasis, the authors collected hundreds of snails of the species *Oncomelania* (=*Hemibia*) *hupensis*, Gredler, and found 5 per cent. naturally infected with *S. japonicum* cercariae. This species closely resembles the Japanese carrier. Mice were successfully infected experimentally. The only other snail in the region with which *O. hupensis* can be easily confused is *Melania cancellata*, the youngest forms of which are about the size of the largest schistosoma carrier.

The Melanias, however, live only beneath the surface of the water, and the shell is much harder, with the vertical ridges more prominent and further apart.

II. The intermediate host lives close to the edge of clear, relatively still, fresh water. It is most plentiful on the banks out of the water but within two feet of the water edge. In the water it is found commonly on water-grass stalks a few inches above or beneath the surface near the shore. It never occurs on the main canals around Soochow but on the small and especially on the terminal branches. Its almost constant absence from the rice fields is due to their height above the water level. There appears to be a marked seasonal variation in the habit of this snail, for in cold weather it could not be found in localities where it had been abundant previously. The authors have found that the geographical distribution of the molluscan carrier is wider than the known endemic areas of schistosomiasis.

R. T. L.

FAUST (Ernest Carroll) & MELENEY (Henry Edmund). **The Life History of** *Schistosoma japonicum* **Katsurada.**—*China Med. Jl.* 1923. Sept. Vol. 37. No. 9. pp. 726–734. With 4 figs.

This paper describes the morphology of *S. japonicum* egg and miracidium as found in the Yangtze valley. It states that the carrier in the Soochow district is *Hemibia schmackeri* [which apparently is a species of *Oncomelania* close to *hupensis*]. In experimental infections the miracidium becomes a sporocyst in about five days. The daughter sporocysts begin to form in three weeks. Cercariae are produced in the ninth week. The process of invasion of the skin is described and in some cases appears to extend over a period of two days. The average cercaria reaches the lung within 48 to 70 hours. The majority thereafter pass onwards through the lung capillaries and reach the systemic circulation. Some penetrate the tissues of the lung reaching the pleura, but these are apparently side-tracked forms. Those individuals which pass through the arterial circulation into channels other than the hepatic portal system are unable to secure proper nourishment and degenerate, thus becoming emboli and acting as toxic elements. Possibly this assumption accounts for the urticarial rash. The greatest development of the young worm occurs from the 14th to 19th day. Sexual differentiation and mating was observed as early as the 17th day, although sexual maturity is not reached before the 30th day. The authors emphasize the importance of skin infection and affirm that "it is no more than theoretically possible for the cercariae to penetrate through the oral mucosa," but do not give reasons for this view.

R. T. L.

MENDOZA-GUAZON (Maria Paz.). [In English and Spanish.] **The Probable Endemicity of** *Schistosomum japonicum* **in the Philippine Islands. La probable endemicidad del** *Schistosomum japonicum* **en Filipinas.**—*Jl. Philippine Islands Med. Assoc.* 1922. Jan.-Feb. Vol. 2. No. 1. In English, pp. 1–6. In Spanish, pp. 31–36. With 1 fig. [22 refs.]

To the 21 previous records of *S. japonicum* in the Philippines the author adds nine additional cases observed between 1912–1922. Seven of these were from Manila, but these may have been transients

and acquired infection elsewhere. Two were from the island of Samar, from which 7 previous records occur in the total of 21. None of the new cases were diagnosed antemortem. The author recounts the recent work on the life history of the worm and on pathology of the disease, in view of the likelihood that the infection may prove to be more prevalent than hitherto has been supposed.

R. T. L.

DAY (H. B.). **The Out-Patient Treatment of Bilharziasis, with an Analysis of 1,000 Cases.**—*Lancet.* 1921. Mar. 12. pp. 525–529. With 6 charts and 1 text fig. [5 refs.]

Seeing that 80 per cent. of the agricultural population of Egypt are infected with schistosomiasis, in-patient treatment is impracticable. To overcome the difficulty a tent-annexe was erected at the Kasr-el-Aini hospital to test the efficacy of out-patient treatment. By this means between 100 and 200 cases could be dealt with monthly, and the author here places on record an analysis of the first 1,000 patients suffering from active infection. Of these there were 897 males and 103 females, and 118 were under the age of ten years. 87·5 per cent. were cases of urinary infection. A 6 per cent. solution (1 grain in 1 cc.) of tartar emetic was employed and injected intravenously. The initial dose was 1 grain, the second 1½ gr., subsequent doses 2 gr., administered on alternate days, the duration of treatment being controlled by the effect on the ova. As a rule nothing was observed till the eighth day. Charts are plotted which show graphically the days of administration, the doses given, and the percentage of dead ova found on examination.

An intensive course, totalling 8-9 grs. in the first week, seemed to give excellent results, but it was found that two or three months later ova were again present, although re-infection could be ruled out. It appeared that 13 gr. was the smallest curative amount, and usually 24 gr. or more were needed. In other words, the primary effect of antimony in schistosomiasis is the destruction of the ciliated embryos within their shells, the parent worms requiring a larger lethal dose.

Colloidal antimony was also tried; this has the advantage that it can be given intramuscularly, but the dose for adults is comparatively large (5–10 cc.). Emetine also proved effectual, but here, again, large doses, up to 3½ gr. for each injection, are needed, and, owing to its irritant action on the tissues, it is best given intravenously. Its cost, however, is almost prohibitive as a routine treatment for out-patients, but it is of service for patients who are intolerant of tartar emetic, and for cases complicated by amoebiasis.

To obtain the best results from a prophylactic point of view the peasantry must be awakened to an intelligent knowledge of the disease; hence the value of systematic instruction in schools and the use of posters and kinematograph films.

H. H. S.

CAWSTON (F. G.). **The Treatment of Bilharzia Disease in Natal.**—*S. African Med. Rec.* 1923. Oct. 27. Vol. 21. No. 20. pp. 472–475.

Bilharzia patients are more disposed to the formation of renal calculus and to appendicitis than others. Later experiences show that treatment with intramuscular emetine or intravenous antimony must be continued for at least 28 days to produce permanent cure in a vast majority of cases. The potassium salt of antimony has proved the most serviceable in all cases except where intravenous medication is contra-

indicated, as in children. Dissolved in saline the antimony salts are much less toxic than in distilled water. Lack of toleration is seldom met when not more than 1½ grain doses are used. Rarely depression or increased albuminuria towards the end of the third week renders the suspension of treatment for a while desirable. With emetine ½ to 1½ grains intramuscularly on alternate days is apt to produce cardiac depression, which may be overlooked if the patient be confined to bed. The use of 1 per cent. rhenol and an occasional hot sea-water bath prevents irritability from the local discomfort of the injections in young children. Larger doses of emetine or too rapid increase in the dose of tartar emetic may induce vomiting. Tables are given showing two series of cases treated with emetine and tartar emetic.

R. T. L.

PHEASE (R. N.). **Report on the Efficiency of the Treatment of Bilharziosis by Intravenous Injections of Antimony Tartrate, after Two Years.**—*Jl. Roy. Army Med. Corps.* 1923. Sept. Vol. 41. No. 3. pp. 206–209.

Forty-four cases of active bilharziasis were detected in the 2nd Battalion Royal Ulster Rifles on their arrival in Egypt from Mesopotamia in May 1921, and during the following 7 months 57 further cases developed. All were treated with intravenous injections of tartar emetic and 10 grains of urotropin t.d.s. The average number of days under treatment amounted to 44 approximately and the average amount of tartar emetic amounted to 10·9 gr. The immediate effects were eminently satisfactory, but in 20 per cent. of the cases the cure was not permanent. The author considers that all cases should be kept under observation for at least two years after discharge from hospital.

R. T. L.

NOGUE & BOULAY. **Note préliminaire sur l'insuffisance rénale chez les bilharziens. Essais de traitement par l'émétique.**—*Bull. Soc. Path. Exot.* 1923. July 11. Vol. 16. No. 7. pp. 564–566.

The authors tested 24 patients infected with schistosomes, 22 with *S. haematobium* and 2 with *S. mansoni*, as regards renal insufficiency and the effects of injections of tartar emetic upon them. The figure relied upon was Ambard's constant. In 15 of the cases this was in the neighbourhood of 0·115. Those with a high constant (*e.g.*, those with definite chronic nephritis and oedema) bore the drug remarkably well; the anasarca disappeared and, in some, the constant became normal; in others, although the figure remained the same, the oedema receded. The course of treatment was prolonged, a total of 1·3 gm. being given to one nephritic patient, who left the hospital cured.

H. H. S.

PEDERSON (James). **Report of a Case of** *Schistosomum haematobium.*—*Jl. of Urol.* 1923. Aug. Vol. 10. No. 2. pp. 175–180. With 2 figs.

This is a brief report of a lad, 17 years of age, who had suffered from intermittent haematuria since the age of 10 years when he returned to the United States from South Africa. Ova of *S. haematobium* were found in the urine and tartar emetic was injected intravenously, beginning with 0·5 gr. and increasing to 2·75 gr. In all, 25 injections were given during a period of two and a half months, and no ova have been found since the twelfth injection. [The total amount of the drug used is not stated, and by mistake on p. 177 the maximum dose is given as 2·75 grams.]

H. H. S.

POMME & ABDEL-KADER-SABBACH. **Un cas de bilharziose vésicale à Damas, traité par l'antimoine en injections intraveineuses.**—*Arch. Méd. et Pharm. Milit.* 1923. Mar. Vol. 78. No. 3. pp. 290–293.

The case is recorded of a Syrian, 20 years of age, suffering from urinary schistosomiasis. He had never been away from Damascus, a district previously said to be free from bilharzia. Treatment by tartar emetic intravenously gave excellent results. The initial dose was 3 cgm., the maximum 12 cgm., thirteen injections were given in 19 days, the total quantity of the drug being 1·2 gm.

H. H. S.

BONNET (M.). **Un cas de bilharziose vésicale traitée par less injections intraveineuses d'émétine.**—*Jl. d'Urol.* Paris. 1921. July. Vol. 12. No. 1. pp. 15–18.

A detailed account is given of a Senegalese, aged about 25 years, suffering from urinary schistosomiasis and treated by intravenous injections of emetine.

On cystoscopic examination the " bilharzial granulations " were seen to be very numerous in the region of the trigone, 15 per field. There was an eosinophilia of 28 per cent., but ascaris and trichuris were also present. The initial dose of emetine was 2 cgm. and the dose was increased every other day till at the ninth injection 10 cgm. were given. Six more injections of 10cgm. were administered on alternate days, a total of 1·14 gm. The patient now complained of giddiness. For six days the drug was stopped ; the eosinophilia was now 6 per cent. The emetine was then restarted, 10 cgm. every three days, but after five injections the patient developed pleurisy and no more was given. The action on the ova was as follows : At first they contained living miracidia, but by the time the fifteenth injection was given there was no more haematuria and the eggs passed were degenerate and had fragmented shells. The cystoscope revealed small patches of dirty yellow colour beneath the mucosa consisting of dead ova. The patient remained in hospital for a month after the last injection, but neither blood nor ova were again found in the urine and the eosinophilia had come down to 4 per cent.

The author regarded emetine administered intravenously as the best treatment for bilharziasis.

H. H. S.

ESQUIER (A.). **Traitement de la bilharziose vésicale par le novarsenobenzol.**—*Congrès de la Santé Publique et de la Prévoyance Sociale, Marseille, 11–17 Septembre, 1922. Comptes Rendus.* pp. 99–104.

The author records three cases of urinary schistosomiasis treated by intravenous injections of novarsenobenzol. Two courses were given to each, the doses of the first course increasing from 0·05 or 0·1 gm. to 0·9 gm., and the duration 5–6 weeks. An eosinophilia of 37 was reduced to 4 per cent. in one patient, to 3 per cent. in another. The improvement, both local and general, was great, but in each case a second course was administered some 4–5 weeks after the termination of the first, the initial dose now being 0·3 gm. and the maximum 1·2 gm. None of the patients gave any untoward reaction after the injections. The masses still seen in the bladder wall by cystoscopic examination consisted of dead ova.

H. H. S.

FAUST (Ernest Carroll). **Treatment of Schistosomiasis japonica.**—*China Med. Jl.* 1923. Oct. Vol. 37. No. 10. pp. 847–849. [6 refs.]

The paper is one intended to advise those proposing to give preparations of antimony for the cure of Asiatic schistosomiasis. It briefly summarizes published work by others and does not include new observations.

R. T. L.

TANABE (Bunshiro). i. **The Life History of a New Schistosome,** *Schistosomatium pathlocopticum* **Tanabe, found in Experimentally-infected Mice.**—*Jl. Parasit.* 1923. June. Vol. 9. No. 4. pp. 183–198. With 7 plates. [14 refs.]

——. ii. **Complement-Fixation Test of** *Schistosomatium pathlocopticum* **and its Group Reaction with** *Schistosoma japonicum.*—*Ibid.* pp. 230–233. [4 refs.]

i. Specimens of *Limnaea palustris* in the neighbourhood of Boston are infected with a furcocercous cercaria with a pair of pigmented eye-spots, six pairs of flame-cells and three pairs of cephalic glands. Young mice were experimentally infected, and the adults obtained were found to belong to a new genus and species named and described in this paper as *Schistosomatium pathlocopticum.* The normal host is unknown.

ii. By employing as antigen an alcohol extract of *Limnaea palustris* infected with the cercaria of *Schistosomatium pathlocopticum* complement-fixation tests were definitely positive for a white rat which had been experimentally infected 5 months previously with this parasite. The test was weakly positive for two white rats experimentally infected 5 weeks previously with *S. japonicum.* This confirms the view that the reaction is a group one applicable to other species of schistosomes than that producing the infection.

R. T. L.

YAMADA (Shiro). [**Supplementary Contribution to the Study of** *Sparganum mansoni*, **Cobbold.**]—*Osaka Igakkwai Zasshi*, (*Jl. of Osaka Med. Soc.*). 1923. Feb. Vol. 22. No. 2. [Summarized in *Japan. Med. World.* Tokyo. 1923. Aug. 15. Vol. 3. No. 8. p. 191.]

The worm, which occurs in the muscle of the frog, does not develop into an adult form in the gut of the dog, nor does infection follow when the dog has been fed with the infested cyclops containing onchospheres. The dog is the second intermediary in whose subcutaneous tissues or muscles the worm attains its full development. If the Sparganum as found in the tissues of the dog were fed to another dog it would develop into adult form in the gut of the latter. Sparganum in man may arise (*a*) by taking raw flesh of domestic fowl infested with sparganum and (*b*) by drinking fresh water containing the infested cyclops. It requires two intermediaries, firstly cyclops and secondly fowls, snakes, dogs, cats, swine, monkey, man and other carnivorous animals and as the final hosts the cat, dog and probably other carnivorous animals.

R. T. L.

MILLS (Ralph G.). **Notes on the Occurrence of** *Taenia saginata* **in North China.**—*Jl. Parasit.* 1923. June. Vol. 9. No. 4. pp. 214–220. [7 refs.]

Twenty-five years ago infestation with *Taenia saginata* was common in North China, but according to FAUST such infection occurs rarely in Peking and the vicinity to-day. The author is of opinion that this is an

erroneous assumption. From unofficial statements it would appear that about 15,000 cattle are brought annually within the walls of Peking for consumption, *i.e.*, one for 80 persons. When the allowance for 3,000 foreigners, numerous wealthy Chinese and for hotels, etc., is deducted the proportion for the ordinary Chinese population is very much less. Out of 4,500 hospital cases examined in the Peking Union Medical College during a period of two years, 12 harboured or were suspected of harbouring *T. saginata*. Ten were orientals and two were foreigners, and all had contracted the infection in Peking. Chinese methods of preparing beef are apparently fairly effective in most cases, but suspicion rests on the restaurants as the source of occasional infections. The author reports the finding of *Cysticercus bovis* in beef offered for sale in Peking. A good deal of medicine for the treatment of tapeworm is sold on the street or in the fairs from itinerant drug merchants and relatively little by the established native drug shops.

R. T. L.

WOODLAND (W. N. F.). **The One-Host Life-Cycle of *Hymenolepis fraterna*, Stiles, of the Mouse.** Correspondence.]—*Nature*. 1923. Sept. 22. Vol. 112. No. 2,812. p. 436.

The experiments of GRASSI, and more recently of JOYEUX, which showed that *Hymenolepis fraterna* of the mouse is capable of undergoing its larval development in the intestinal mucosa of the same species of host, have been repeated by the author and their conclusions verified.

R. T. L.

FERGUSON (James) & TUDHOPE (G. Ranken). **Two Cases of *Dipylidium caninum* in Children.**—*Lancet*. 1923. Oct. 13. p. 828. [5 refs.]

Both cases recorded are from Scotland. The first was a bottle-fed baby and the segments were first observed in the stools during the fifth week of life. The second case was 5½ months old.

R. T. L.

NEVE (Ernest F.). **A Case of Hydatid Cysts of both Lobes of the Liver.**—*Indian Med. Gaz.* 1923. Aug. Vol. 58. No. 8. pp. 380–381.

A Mahommedan boy, 12 years of age, was admitted to the Kashmir Mission Hospital with a tense elastic swelling of the left lobe of the liver and a deep-seated mass in the right hypochondrium. The patient was jaundiced and suffered also from a certain degree of night-blindness. Operation showed that both swellings in the liver were due to hydatids. The author calls attention to the presence of night blindness with impairment of liver function, and in this connexion mentions a previous case in which cirrhosis of the liver was associated with the same symptom.

H. H. S.

FAIRLEY (K. Douglas). **The Investigation of the Immunity Reactions in Hydatid Disease. A Preliminary Report.**—*Med. Jl. Australia.* 1923. July 14. 10th Year. Vol. 2. No. 2. pp. 27–37. [10 refs.]

This investigation was undertaken with a view of finding a reliable test less intricate than that of complement fixation for the diagnosis of hydatid disease. The author discusses three tests:—1. The absolute eosinophile count, 300 per cmm. being regarded as the limit of the normal. 2. The Precipitin test. 3. The Intradermal test of CASONI. The first is of doubtful value, as there are several other causes of eosinophilia, all of which would have to be excluded; it is useful, however, as an auxiliary sign.

The second proved very nearly as reliable as the complement fixation reaction and has the additional advantage that a carbolized antigen (1 vol. of 5 per cent. carbolic acid added to 10 vol. of fresh hydatid fluid from the sheep) retained its properties for at least six months. For the test 0·4 cc. of antigen is placed in a small tube such as is used for macroscopic agglutination reactions, and an approximately equal amount of the patient's serum is added. No shaking is needed and the mixture is left at room temperature for 30–36 hours. In a series of 69 tests 52 were positive by the precipitin reaction, 56 by that of complement fixation.

For the Casoni test 0·5 cc. of filtered hydatid fluid (obtained from cysts of sheep or human patients and passed through a Berkefeld filter and stored in ampoules or vaccine bottles in the ice-chest), to which had been added pure phenol in the proportion of one drop to 20 cc. fluid, is injected intradermically. In positive cases there ensues in a few hours oedematous infiltration, local heat, sometimes redness and itching, which usually passes off in 48–72 hours, but in severe cases the signs may persist for a week. Of 72 proved cases 40 gave a positive reaction. Different fluids vary considerably in their potency; that obtained from one patient failed to give any positive reaction even in proved cases. Further, the test may be negative even years after operation in spite of the fact that a second cyst is present. On the other hand, the result was invariably negative in non-hydatid patients, and was occasionally positive when the precipitin and complement fixation tests had given a negative. The Casoni test was negative if the cyst had suppurated, whereas the other two serological tests gave marked positive results under these circumstances.

In his summary of conclusions the author states as regards the precipitin test that it "gives results practically identical with those of the complement fixation test . . . . it can easily be done without any special preliminary laboratory training."

H. H. S.

PATTERSON (S. W.) & WILLIAMS (F. E.). **Preliminary Note on a Stable Antigen for the Hydatid Complement-Fixation Test.**—*Med. Jl. Australia.* 1923. Nov. 3. 10th Year. Vol. 2. No. 18. p. 467. [2 refs.]

Alcoholic extracts of hydatid scolices have considerable antigenic value, but, unfortunately, give pseudo-positive reactions with syphilitic sera. By evaporating off the alcohol at room temperature and taking up the residue in distilled water or 0·9 per cent. salt solution an antigen is obtained of strong antigenic value which gives no fixation of complement in the presence of syphilitic sera and has kept its properties apparently without diminution for fifteen months.

R. T. L.

ITHURRAT (P. F.) & CALCAGNO (B. N.). **Étude de la valeur comparée des différentes réactions biologiques dans le diagnostic de l'échinococcose.** —*Presse Méd.* 1923. Sept. 5. Vol. 31. No. 71. pp. 765–766.

The authors discuss briefly the results of the tests commonly employed for the diagnosis of hydatid cysts. None appears to be infallible, and it is recommended that complement deviation, intradermal reaction and the eosinophile count should all be performed. From a consideration of the three a correct decision can usually be reached. They place most

reliance on the intradermal test, and find, as others have done, that the fluid from an animal cyst gives generally better results than that from a human case. They state that suppuration of the cyst does not affect the reaction. [This is at variance with what was found by K. D. FAIRLEY. See above.]

H. H. S.

DEW (Harold R.). **Observations on the Mode of Development of Brood Capsules and Scolices in the Encysted Stage of** *Taenia Echinococcus.* *Med. Jl. Australia.* 1922. Sept. 30. 9th Year. Vol. 2. No. 14. pp. 381–384. With 18 text figs. [5 refs.]

The exact mode of development of brood capsules, scolices and daughter-cysts in Echinococcus has always been uncertain and the descriptions hitherto given, to say the least, confusing. Dr. Dew in this paper takes up the first two questions and gives a remarkably clear exposition of a difficult subject. The essential point to grasp first is that the brood capsules, daughter-cysts and the laminated layer all develop from the parenchymatous or germinal layer.

1. *Development of Brood Capsules.* These first appear as multiplications of small nuclear masses of the parenchymatous layer. The nodules so formed grow, become vacuolated to form vesicles—the brood capsules from which the scolices develop.

2. *Development of Scolices.* There is a local thickening of the wall of the brood capsule (like the brood capsule itself growing from the cyst wall) and on the inner surface of this the hyaline cuticular material is laid down. As these increase in number the wall of the capsule bulges or evaginates to form a protective cup for the growing scolex. Near the head end the cuticle thickens and a circlet of hooklets develops. As growth leads to the projection of the heads into the cavity and these may be injured or the hooklets knocked off by contact with other scolices, there is a contractile part of the body of the scolex capable of invaginating the head, so that the typical resting position of the scolex has the hooklets inside with the free extremities pointing anteriorly. Each scolex has the definite hyaline cuticle running on to the stalk and adjacent part of the wall of the brood capsule, whereby the latter appears to possess a partial hyaline layer. This, however, is never complete, but has given rise to the notion of a reversal of layers in a brood capsule. Budding from the exterior was never observed [though depicted and described in text books], but if the brood capsules ruptures, which it may with very slight trauma, the thin wall tends to turn inside out and give the appearance of external budding.

The author states that he intends to issue in the future a communication on the development of daughter-cysts. This will be awaited with much interest.

H. H. S.

PORTER (Annie). **On the Effects of Cold on the Vitality of Certain Cysticerci and Echinococci in Meat kept under Commercial Conditions of Freezing in Johannesburg.**—*Publications of the S. African Inst. for Med. Res.* 1923. Feb. No. 16. 49 pp. [12 refs.]

Motility has been applied as the criterion of evidence of life in the case of cysticerci in frozen meat, and it has been concluded that the freezing for three weeks of meat infested with tapeworm cysts is sufficient to destroy the vitality of the cysticerci and prevent their development in man.

These conclusions appear to have been based upon experiments with isolated cysticerci or with relatively small joints of infested meat and may not prove applicable under modern conditions. The author has had facilities in the Johannesburg Municipal Abattoir whereby whole carcases or portions of carcases of infested beef and pork could be stored in freezing chambers for as long as was necessitated by experimental requirements. The freezing was done under ordinary commercial conditions under the personal supervision of the trained veterinary surgeons. As a result of numerous well conceived experiments, which are detailed in the paper, the author concludes that staining especially with methyl green slightly acidulated with acetic acid is the most satisfactory means of testing the viability of *Cysticercus bovis* and *C. cellulosae.* Dead cysticerci stain relatively deeply and rapidly as compared with the living forms. Hydatids of *Taenia echinococcus* frozen for 30, 43, 61 and 70 days when fed to dogs resulted in infection. After being frozen for one month the *Cysticercus fasciolaris* of the mouse developed in its normal definitive host the cat. By analogy confirmed by staining reactions, it is concluded that brief periods of freezing are insufficient to kill *C. bovis* and *C. cellulosae.*

It is suggested that " a period of at least 12 weeks freezing of slightly infested beef or pork at a temperature of 14° F. (*i.e.* = 10° C.) should be undergone before the meat may be regarded as sterile and the cysticerci as dead." Where heavy infestations occur the carcase should not be used for human food even after this period and would be more satisfactorily disposed of if sent to the inedible-tallow factories.

R. T. L.

THIRA (Tokuzo). **Studien über** *Strongyloides stercoralis.—Mitt. d. Med. Gesellsch. z. Tokio.* 1919. June. Vol. 33. No. 11. pp. 2–3.

As the result of the examination of the intestines of two human cases of infection with *Strongyloides stercoralis* and of animal experiments carried out on cats and apes the author draws the following conclusions:—1. If the parasites are present in sufficient numbers they injure the mucosa and lead to the formation of ulcers and general ill-health ; 2. The rhabditiform larvae from the parasitic form can penetrate equally as well as those from the free-living ; 3. Some of the rhabditiform larvae may be transformed into the filariform *within* the body and these can be seen in the muscularis, in the lymph vessels and in the veins of the submucosa, and thus auto-infection is possible ; 4. The site of penetration by the filariform larvae may remain open for some time and other larvae and bacteria in large numbers may enter by the same route ; 5. A dog was infected by rectal injection of filariform larvae contained in a *fresh* stool.

[A series of 35 microphotographs is presented to illustrate some of these points, but the fuller paper and the remarks on the illustrations are unfortunately in Japanese, but, if the above findings are confirmed, our present ideas on the life-history of this parasite will need revision.]

H. H. S.

THOMAS (Erich). **Ueber Darmerkrankungen durch** *Strongyloides intestinalis.* [Bowel Infection with *S. intestinalis.*]—*Deutsch. Archiv. f. Klin. Med.* 1922. Dec. Vol. 141. Nos. 3 & 4. pp. 129–150. [38 refs.]

The author records a human case of infection by *Strongyloides intestinalis* and brings forward arguments to show that it is by no means always a harmless parasite, but may cause definite and, at times, severe symptoms—intermittent abdominal pain, diarrhoea with mucoid and sanguineous stools, eosinophilia (12–18 per cent.), perhaps rise in temperature and some degree of secondary anaemia. In this case other infections, such as concomitant ankylostomiasis or disease due to typhoid or paratyphoid organisms, were excluded and the condition cleared up after administration of large doses of thymol. 1 gm. daily was given at first, but 10 gm. daily were needed before the stools were found free of larvae.

H. H. S.

CRUICKSHANK (J. A.), CUNNINGHAM (J.) & IYER (T. Seethapathy). **Studies in Filariasis. No. 1. A Filarial Survey with a Statistical Enquiry into the Relationship between Filariasis and Elephantiasis.** —*Indian Jl. Med. Res.* 1923. July. Vol. 11. No. 1. pp. 79–91. [3 refs.]

The proximity of the King Institute, Guindy, Madras, to a heavily infected area—the village of Saidapet—has provided an opportunity of re-investigating the question of the relationship of filarial infection to elephantiasis. A statistical survey was made of the whole village in the course of which 1,510 persons were examined, of whom 738 were males and 772 females. The results have been tabulated in exact accord with the STEPHENS' (1920) scheme and the results are shown to be at variance with those obtained by STEPHENS. In Southern India it has been found that (*a*) microfilariae are less commonly found in those with the recognised signs of filarial disease than in those without these signs ; (*b*) the signs of filarial disease are less frequent among those infected with microfilariae than among those not so infected ; (*c*) the microfilaria rate in cases of elephantiasis is very much lower than that recorded in Fiji ; (*d*) the proportion of persons affected with elephantiasis regularly increases with age. The results in this paper tend to confirm the view that possibly there are differences in the pathological effects produced by filariae in different areas.

R. T. L.

LE CHUITON. **La filariose à Saigon ; observations prises à la caserne des marins.**—*Arch. Méd. et Pharm. Nav.* 1923. June-July. Vol. 113. No. 4. pp. 294–312. [10 refs.]

Filariasis has usually been considered a rarity in Saigon. In November 1922 the author found filarial embryos in milky fluid obtained from a hydrocele and consequently made systematic examinations of the inmates of the barracks and found 15·47 per cent. infected. Of each of these brief details are given. Though the disease appears to have increased since the first case was recorded by Noc in 1907, it has probably been overlooked because the cases are usually mild, exhibiting mainly small lymphatic varicoceles, while the more obvious manifestations—lymph-scrotum, chyluria, elephantiasis—are not met

with. Filariasis undoubtedly exists in Cochin-China since 8 of the 15 had never been out of the country. Differential leucocyte counts were made of each of the cases recorded and the proportion of eosinophiles was found to vary between 5 and 24 per cent., with an average of 11·53.

H. H. S.

GUZMÁN (P. A.). **Contribución al estudio de la Filariasis en Venezuela. Filariasis de Bancroft.**—*Gac. Méd. de Cacaras.* 1923. Mar. 15. Vol. 30. No. 5. pp. 65–69. [11 refs.]

The main object of this paper is to point out the extensive prevalence of filariasis in Venezuela. Seven cases are recorded. In six of these, suffering respectively from chyluria, haematochyluria, chylous diarrhoea, chylocele, abscess of the thigh, and varicose groin glands, filarial embryos were found in the blood of the patients and of others in the family also. Six cases of elephantiasis are mentioned, one in detail, but in none of these was the embryo discovered.

H. H. S.

YAMADA (Shinichoro). [**Descriptions of Ten New Species of *Aëdes* found in Japan, with Notes on the Relation between some of these Mosquitoes and the Larva of *Filaria bancrofti* Cobbold.** —*Annot. Zool. Jap.* 1921. Vol. 10. Art. 6. pp. 45–81. With 4 text figs. [Summarized in *Japan. Jl. Zool.* Tokyo. 1922. Vol. 1. No. 1. (Abstracts.) p. 5.]

Of 13 species of Aëdes examined by the author *Aëdes togoi*, a very common species in Japanese territories, proved able to serve as an intermediary for *Filaria bancrofti*, while partial development to a certain degree occurred in *A. galloisi*, *A. chemulpoensis* and *A. esoensis*. As a general rule, however, the species of Aëdes are resistant.

R. T. L.

SHATTUCK (George Cheever). **A Case of Filariasis apparently contracted in Boston.**—*Boston Med. & Surg. Jl.* 1923. July 26. Vol. 189. No. 4. pp. 142–144. [5 refs.]

A white woman, 25 years of age, born in Charlestown, Massachusetts, who had never travelled far from Boston, came to hospital with elephantiasis of the left leg. Filarial embryos were found in the blood taken at midnight. The author refers to his previous paper on sporadic elephantiasis in Boston [*Boston Med. & Surg. Jl.* 1910] and briefly discusses the possible origin of this case.

Culex fatigans is the transmitter of filariasis in Charlestown, the one active endemic focus in the South, but the common mosquito of Boston is *Culex pipiens*, which can convey the disease in China and may have done so in the present instance. [See also this *Bulletin*, Vol. 20, p. 751.]

H. H. S.

VAIDYA (B. A.). **Filarial Haemoptysis.** Correspondence.—*Indian Med. Gaz.* 1923. Sept. Vol. 58. No. 9. p. 450.

The author states that he has knowledge of a case of haemoptysis similar to that reported by Dr. BANERJEE. A medical student had severe haemoptysis and was suspected as a case of tuberculosis. The late Dr. N. F. SURVEYOR diagnosed the case from the blood examination as one of filariasis. The patient ultimately recovered under symptomatic treatment.

R. T. L.

ADLER (S.). **Carbon Tetrachloride in Filariasis.**—*Ann. Trop. Med. & Parasit.* 1923. Oct. 13. Vol. 17. No. 3. pp. 427–429.

In view of the success obtained by the oral administration of carbon tetrachloride in patients infected with intestinal nematodes the effect of intramuscular and intravenous injections of the same drug was tested in patients with filariasis. Experiments were first carried out on dogs to determine dosage. Death resulted from embolism if the carbon tetrachloride was not mixed for intravenous injection with twice its volume of ether. The dose for intramuscular use varied from 0·5 cc. to 2 cc., three injections being given as a rule at five-day intervals; the dose for intravenous injection was 1 cc. carbon tetrachloride with 2 cc. ether.

Local pain, passing off in 5–10 minutes, resulted from intramuscular injection, while with intravenous administration severe coughing was set up and later drowsiness, but whether this latter was due to the tetrachloride or the ether could not be determined. There was no albuminuria or other ill effect, but neither was there any marked diminution in the number of filarial embryos found in the blood. The author suggests that the method should be tried for adult filaria, as *Loa loa*. He has not yet had an opportunity of doing this himself.

H. H. S.

SHARP (N. A. Dyce). *Filaria bancrofti* and *Loa loa*. **A Note on some Methods of Differentiation of their Embryos.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. pp. 177–191. With 1 coloured plate.

The adult male population at Kaduna, the capital of Northern Nigeria, shows a microfilaria infection rate of over 45 per cent. 1,026 individuals, forming ⅓ of the total population, were examined and the blood of 400 of these was also taken at night. Of the total number examined 161 showed *F. bancrofti*, 79 *F. loa* and 280 *F. perstans*. One embryo of *O. volvulus* was seen, but the author supposes that it had escaped from the skin at the site of the puncture.

The paper shows the differential value of vital staining with methylene blue. A drop of blood is placed upon a drop of methylene blue (1 in 5,000). If the embryo be that of *Loa loa* it usually begins to take up the stain within ten minutes and becomes most active. If it be the embryo of *Filaria bancrofti* no stain is absorbed for three or four hours and then only at the V spot. After about half an hour in 1 in 10,000 methylene blue the living loa embryos show a very dark blue core. They usually die within three or four hours, by which time the whole worm is blue. The excretory V spot in about 20 per cent. of the cases is of such proportions as to double or treble the diameter of the worm. The staining varies in different individuals. Interesting differences are also noted when the blood embryos are fixed and stained in 1 in 30 Giemsa for six to twelve hours. By this technique the loa embryos appear much thinner and more deeply stained than those of *F. bancrofti* and the sheath is not visible. Numerous other differences of detail are noted in the paper. The Giemsa method enables one to further differentiate the "greater" and "lesser" *Microfilaria perstans* hitherto distinguished only by size. Although *Filaria bancrofti* embryos occur in the blood of 16 per cent. of all males in Kaduna no case of elephantiasis has come under the author's notice during a stay of fifteen months. Hydrocele is, however, common and the fluid almost always contains embryos.

The paper concludes with some clinical notes of cases.

R. T. L.

KIMBERLIN (J. W.). *Filaria loa.* **Report of Case of Removal from the Subconjunctival Tissues.**—*Jl. Amer. Med. Assoc.* 1922. Nov. 17. Vol. 81. No. 20. pp. 1685–1686. (Discussion pp. 1686–1687.) [10 refs.]

After a somewhat lengthy review of the literature and of records of imported cases in America, the author describes the clinical appearances of a case in one who had spent some time in Africa. The only point of noteworthy interest lies in a statement by Dr. A. BARKAN, San Francisco, to the effect that he had 30 or more years ago reported in one of the early volumes of KNAPP'S *Archives of Ophthalmology* a case in which he had removed a *Filaria medinensis* [?] from the pupil of the eye of a man from Australia. There were no particular symptoms, nor was there pain or irritation, but there was "a pretty little white thread floating about in the anterior chamber" which was floated out through an incision under physostigmine.

R. T. L.

LOW (GEORGE C.). **The Aetiological Relationship of** *Loa loa* **to Calabar Swellings.**—*Jl. Helminthology.* 1923. Sept. Vol. 1. No. 4. pp. 191–192.

In two cases of Calabar swellings which did not show embryos in the blood the author has examined the serum obtained by puncture of the swellings, carrying out in detail the technique suggested by MANSON. The conclusion reached is that it is unlikely that the swellings are due to an adult female giving birth to young embryos. The possibility that the death of the adult worm may be the immediate cause of the swellings is mooted.

R. T. L.

CORSON (J. F.). **The Occurrence of the Larvae of** *Onchocerca volvulus* **(Leuckart, 1893) in the Skin of Natives of the Gold Coast.**—*Ann. Trop. Med. & Parasit.* 1922. Dec. 30. Vol. 16. No. 4. pp. 407–420. With 2 plates and 1 fig. [13 refs.]

The larvae of *Onchocerca volvulus* have rarely been found in the blood, but according to the author's observations they occur in numbers in the skin. 290 prisoners at Seccondee, Gold Coast, were inspected; 16 had subcutaneous tumours, and of other abnormal conditions of the skin 24 had lichenification, 1 elephantiasis, 5 craw-craw and 3 thickening of the skin but not localized as in elephantiasis. In 33 signs of scratching were present. 24 of these cases were selected for investigation. A piece of skin about half a sq. cm. was excised from the left lower dorsal region and put into saline. In 15 of these cases larvae of *O. volvulus* were recovered from the sample. A series of measurements is given to show that the larvae from the skin are actually identical with those of *O. volvulus* removed from tumours. No clear causal relationship between the larvae and the conditions of craw-craw, elephantiasis and lichenification was evident in the cases investigated.

R. T. L.

LE DENTU (R.). **Le traitement du ver de Guinée par les injections intraveineuses d'émétique.**—*Bull. Soc. Path. Exot.* 1923. July 11. Vol. 16. No. 7. pp. 566–567. [1 ref.].

The author treated 30 patients suffering from guineaworm with daily intravenous injections of tartar emetic, 2–3 cc. of 2·5–3 per cent. solution. Though not infallible the drug gave on the whole very encouraging results. In 14 cases complete expulsion of the worm followed (2 after the first injection, 2 after the second, 4 after the third, 3 each after the fourth and fifth). In ten patients, although the worm remained, the inflammatory phenomena disappeared. In the other six there was no change.

H. H. S.

PEYROT (J.). **Délire onirique et filaire de Médine.**—*Jl. de Méd. de Bordeaux.* 1923. Nov. 25. Vol. 95. No. 23. pp. 940–941.

A remarkable case of delusional insanity in a native soldier in whom, after he had been in hospital under observation for a week, a guineaworm was seen making an opening in the middle third of the right leg. It was removed at two sittings on consecutive days by traction after local application of chloroform, and the symptoms rapidly and entirely cleared up. There was no sign of any other disease, the Wassermann reaction was negative, and the case is regarded as an unusual instance of toxic psychosis.

H. H. S.

YOKOGAWA (Sadamu). **On Ascariasis and the Life-History of Ascaris.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1923. July. No. 229. pp. 1–18. With 9 plates.

Provided the temperature is suitable development takes place in the Ascaris egg not only under relatively dry conditions but even in absolutely dry surroundings, although in the latter case death occurs during or after the formation of the embryo. Disinfection of faeces containing Ascaris can be accomplished by heat. The use of boiling water for washing edible vegetables and fruits is advocated.

In the hatching of the egg digestive juices do not appear to play a part. What are essential are full development of the embryo, suitable temperature, and peristaltic motion of the intestine to stimulate the movement of the embryo within the egg. There is a conspicuous accumulation of eosinophil cells wherever the Ascaris larvae are found. The author has studied afresh the migratory course of *Belascaris marginata* larvae in the bodies of experimentally infected dogs and mice. He notes that in the intestinal wall the majority of the larvae are in the lymphatics or blood capillaries: around those free in the muscular coat there is strong inflammatory infiltration, and these are found to be dead after several days. The larvae migrate from the intestine by the lymphatic circulation to the mesenteric lymphatic nodes and so reach the right side of the heart. The larvae which migrate into the abdominal cavity by piercing the gut are only a minority which pass to the lungs by piercing the surface of the liver and so reach the hepatic veins. It is very rare that the larvae pierce the diaphragm and so reach the lungs through the pulmonic pleura.

Various pathological changes, due to Ascaris at an early stage of infection, were noted in various internal organs in stray dogs. In 70 per cent. of 141 there was a peculiar pathological change caused by the larvae entering the kidneys. These changes were studied more fully in experimental animals.

In the intestinal wall in slight infections no changes were recognised, but in intense infections the surface of the mucosa was generally swollen and had dot-like haemorrhages with congestion on the serous surface. Microscopically, tubercles were found due to larvae surrounded by polynuclear leucocytes, eosinophils, epithelioid and lymphatic cells. In lymphatic nodes intense hyperaemic and dot-like haemorrhages occur, with peculiar small white spots where the infection is very intense. Microscopically, it is seen that the larvae may destroy the lymphatic follicles in their neighbourhood, producing inflammatory infiltration, clots of fibrin and degeneration of the tissues. In the liver in intense infections there is heavy congestion, and dot-like or irregular spot-like small haemorrhages are frequently recognised after 2 to 5 days, while as time progresses there are greyish white spots of submiliary size. Microscopically, exudations and localized small haemorrhages occur due to rupture of the interlobular capillary plexus.

In the lungs are subpleural haemorrhages, or in small animals with intense infections haemorrhage in part or the whole of the lung, sometimes causing suffocation. In larger animals these heavy haemorrhages do not occur, but the pleura of the lung may become speckled by the gradual fusion of bleeding foci. As the agent, origin, and appearance of the pneumonia caused by these larvae differs from other bronchopneumonias the term "*Parasitic Pneumonia*" or Ascaris pneumonia should be used. The pathological changes in the kidney, brain and spinal cord, heart, and in the bone marrow and glands of internal secretion are described in turn. Larvae found in the lungs of a pup two days old suggest intrauterine infection. The author supports the increasingly accepted view that the relative absence of worms in older dogs is due to the development of an immunity.

R. T. L.

MATSUBARA (Kinichi). [**On the Pathological Changes occurring in the Lungs in Homogenous Experimental Ascariasis. (A Preliminary Notice.)**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1923. Feb. No. 2,315. [Summarized in *Japan. Med. World.* Tokyo. 1923. July 15. Vol. 3. No. 7. p. 165.]

The symptoms of pneumonia arising from experimental ascaris infection in dogs are thus distinguishable from other forms of bronchial pneumonia :—the larvae are always found in the foci, haemorrhages are almost always present, no oedematous findings occur in or around the foci, and there is no tendency to pass into necrosis of the exudative substances in the alveoli and bronchi. The condition bears a closer resemblance to hyperplastic inflammation of the lungs.

R. T. L.

FRITZ (Otto). **Askariden des Magendarmtraktes in Röntgenbild.** [Ascaris in the Intestinal Tract revealed by X-rays.] *Fortschr. a. d. Geb. d. Röntgenstrahlen.* 1922. Vol. 29. pp. 591–593. With 2 figs.

An account is given of two cases in which obscure abdominal symptoms were present. X-ray examination revealed ascarides wandering from the duodenum into the stomach, and treatment with santonin resulted in cure.

H. H. S.

REITER (Josef). **Zum Röntgenologischen Nachweis von Askariden in Magendarmtrakt.**—*Wien. Klin. Woch.* 1923. Aug. 16. Vol. 36. No. 33. p. 592. With 2 figs.

Two cases are narrated. One patient was a worker on the railway and had sustained a blow on the abdomen. Owing to the persistence of vague symptoms and the passage of blood laparotomy was about to be performed. X-ray examination showed numerous ascarides in the jejunum and ileum and the condition cleared up after administration of santonin. In the second, who had been operated upon for post-enteric cholecystitis, an ascaris was seen by X-rays to be lying coiled in the stomach.

H. H. S.

MAKAI (Endre). **Ueber Spulwürmerabszesse der Leber.** [Ascaris Abscess of the Liver.] *Deut. Ztschr. f. Chir.* Leipzig. 1922. Mar. Vol. 169. No. 5–6. pp. 297–308. [1 ref.]

An interesting account is given of a girl, aged 7 years, heavily infected with ascaris. After administration of santonin and castor oil on Oct. 19th there were passed on successive days 65 and 15 worms, thereafter for 4 days 8–10 daily. On Oct. 10th santonin had been given but, though a few worms had passed, the condition had not improved. On Oct. 27th the temperature rose to 39·3°C., the pulse was rapid, 130 per minute, and severe pain was complained of in the upper part of the abdomen. The general state became worse and the patient very restless. Sepsis in the liver was diagnosed and liver abscess due to ascarides suspected. At operation on Nov. 2nd. a swelling " the size of a nut," yellowish in colour, was found in the liver ; mixed with the pus that was removed were 5 small ascarides, 3 males and 2 females, coiled together, each 3–6 cm. in length, probably 2–3 weeks old. If this is correct, the embryos had reached the liver before the santonin had been administered. No connexion could be made out between the abscess cavity and the bile ducts, and the author thinks that the changes due to lodgement of the parasites in the liver started about the middle of September.

H. H. S.

EICKELBERG (Trude). **Zur Diagnose und Behandlung von Askaris-Erkrankungen.** [Diagnosis and Treatment of Illness due to Ascaris.]—*Deut. Med. Woch.* 1923. Aug. 3. Vol. 49. No. 31 pp. 1020–1021. [3 refs.]

The symptoms associated with Ascaris infection being often vague, the writer made a point of examining the stools of every patient coming to his hospital complaining of gastro-intestinal disturbance. Some of the cases of which he gives brief records had been sent to him with a diagnosis of tuberculosis, owing to their pallor and loss of weight, but they recovered rapidly and completely after a few doses of helminal, ascaris ova having been found on faecal examination. Helminal is the dried extract of *Digenea simplex*, prepared by Merck. The dose for children is one tablet three times a day for two or more successive days ; for adults two tablets. If ova are still present when the faeces are re-examined a week later the course is repeated. Helminal usually acts as its own purgative ; if it fails to do so a dose of castor oil is given.

H. H. S.

CAIUS (J. F.) & MHASKAR (K. S.). **Notes on Ascaricides.**—*Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 377–392. [7 refs.]

Of 19,251 rural inhabitants of the Madras Presidency 55 per cent. harbour roundworms. The infection attains a rate of 85 per cent. in the Moplah community of the Malabar district. The number of worms present in the individual is usually not more than two. As a result of a series of tests with 50 specified drugs the authors conclude that Santonin is the most efficient drug for Ascaris treatment. Chenopodium oil, betanaphthol, thymol and carbon tetrachloride have ascaricidal properties. *Butea frondosa* is the only Indian anthelminthic plant which removes roundworms, and it does not compare with any of the other anthelminthics listed as ascaricidal.

With santonin the limit of tolerance is reached with 6 grains when toxic symptoms such as xanthopsia, giddiness and headache begin to appear; 5 grains may be taken as the optimum dose and is perfectly safe for adult males and produces no after affects. The efficacy of treatment appears to be enhanced by delaying purgation for 12 hours or longer after the taking of the drug. In its effect on the worm santonin is a weak vermicide but a powerful narcotic. It has no vermifugal action and purgation is therefore necessary. The best method of administration is to give the drug at night and to administer Epsom salts on the following morning. The authors attempt to correlate the action of santonin with its chemical constitution. Seven santonin derivatives were prepared and their anthelminthic property tested against that of santonin. The result shows that the anthelminthic properties of santonin are not correlated with its lactone structure. Further study is necessary to determine which part of the santonin molecule is responsible for its anthelminthic properties.

R. T. L.

YOSHIDA (Sadawo) & TAKANO (Ryozo). [**Some Notes on the Albuminous Coating of Ascaris Eggs.**]—*Osaka Igakkwai Zasshi* (*Jl. Osaka Med. Soc.*). 1923. Feb. Vol. 22. No. 2. [Summarized in *Japan. Med. World.* Tokyo. 1923. Aug. 15. Vol. 3. No. 8. p. 191.]

The albuminous coating of Ascaris eggs swells and disappears in weak hydrochloric acid (0·1 per cent.–0·3 per cent.) and in artificial gastric juice at 35°–37° C. This removal is facilitated by stirring or other mechanical treatment. That some eggs are passed in the faeces without their albuminous coating may possibly be explained by the fact that they have been swallowed. In such cases anthelminthic treatment would of course prove futile.

R. T. L.

NYBERG (C.). [**Blueberries in Treatment of Oxyuriasis.**]—*Finska Läkaresällskapets Handlingar.* Helsingfors. 1923. May–June. Vol. 65. p. 354. [Summarized in *Jl. Amer. Med. Assoc.* 1923. Oct. 20. Vol. 81. No. 16. p. 1,401.]

Fresh blueberries [? Vaccinium] are recommended for oxyuriasis. Large children and adults are advised to eat half a litre of the fresh berries three or four times during the first day and once as a meal for the next six days.

R. T. L.

FÜLLEBORN (F.). **Ueber die Entwicklung von Trichozephalus im Wirte.** [Development of Trichocephalus in the Host.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Nov. Vol. 27. No. 11. pp. 413–420. [6 refs.]

Experiments with species of Trichocephalus from man, monkeys and rabbits show that when fed to normal hosts the larvae of Trichocephalus do not reach the intestine by the blood-stream route taken by Ascaris, but apparently reach it direct. This is somewhat strange, as the larvae of the related Trichinella normally enter the blood-stream, and, like these, the larvae of Trichocephalus possess a boring oval spear which would appear to be suitable for piercing tissues. For purposes of study the eggs of Trichocephalus may be collected from faeces by means of KOFOID and BARBER's wire loop method, but as the eggs rise to the surface of the salt solution much more slowly than do those of Ascaris and Ancylostoma it is advisable to collect them some 24 hours later. The eggs should not be covered with water but kept on moist filter paper at 26°C. The larvae take from 3 to 3½ weeks to develop fully. The embryonated eggs of *T. trichiura* can be got to hatch in the gut and principally in the caecum of guineapigs, but they only grow from 140 μ to 224 μ, surviving about 4 days.

R. T. L.

FÜLLEBORN (F.). **Ueber den "Mundstachel" der Trichotracheliden-Larven und Bemerkungen ueber die jüngsten Stadien von** *Trichocephalus trichiurus.*—*Arch. Schiffs- u. Trop. Hyg.* 1923. Nov. Vol. 27. No. 11. pp. 421–425. With 18 figs. [10 refs.]

The larvae of Trichocephalus, Trichina, Hepaticola and Trichosomoides all possess an oral "spear" which can be extruded. This may be taken to indicate that the family to which these genera belong has been derived from freeliving forms resembling Tylenchus. The oral spear has a lancet blade and a shaft. The latter is fixed to the oesophagus. The shaft is flattened while the blade is rounded and has an obliquely truncated tip. The armature recalls that seen in Dorylaimus.

R. T. L.

LAMBERT (S. M.). **Methods of administering Anthelmintics to remove Whipworms, with a Note on a New Method.**—*Amer. Jl. Trop. Med.* Baltimore. 1923. July. Vol. 3. No. 4. pp. 297–305. [9 refs.]

Oil of chenopodium has been tried in doses of 1·5 to 2 cc. as an intravenous injection, and so used has apparently had a marked vermicidal action on Trichuris, little on Ascaris, and none on hookworms. The method is not recommended as a routine treatment in view of the crude form of the oil. Injected intramuscularly this drug has little action on hookworms, but in one case apparently had a marked action on whipworms. It is suggested that the possibilities of these novel methods of administration of chenopodium deserve experimental investigation, preferably on dogs and other suitable animals.

R. T. L.

AUGUSTINE (Donald L.), PAYNE (George C.), CORT (William W.), RILEY (William A.), STOLL (Norman R.), HILL (Rolla B.) & PAYNE (Florence King). **Investigations on the Control of Hookworm Disease. Nos. XIX-XXXI.**—*Amer. Jl. Hyg.* Baltimore. 1923. May. Vol. 3. No. 3. pp. 280–295; 315–342. July. No. 4. pp. 416–443. July Supplement. pp. 1–127. Sept. No. 5. pp. 547–597.

*xix. **Observations on the Completion of the Second Ecdysis of** *Necator americanus*. [AUGUSTINE.] pp. 280–295. With 9 text figs. & 1 chart. [13 refs.]

The two ecdyses undergone by the hookworm larva outside the body are distinctly unlike. The first is due to the increasing size of the larva, which eventually breaks from the old skin. After the larva has reached maturity, however, it shrinks in size, and the old skin is retained as the second sheath, which serves as a protective covering unless broken or shed with the aid of outside agencies or during lateral flexures of the body. The author gives in detail experiments and observations on the factors influencing the loss of this protective sheath. In sand the anterior end of the sheath is worn by friction against rough surfaces, while in clay loams it is retained and becomes broken by the onward movement of the larva. The rate of unsheathing is directly related to the texture of the soil.

These unsheathed larvae are less resistant to unfavourable conditions but are infective and successfully pierce the skin. The adult reared from sheathed and unsheathed larvae do not differ in daily egg output.

xx. **Human Infestation Studies in Porto Rico by the Egg-counting Method.** [PAYNE (George C.), CORT & RILEY.] pp. 315–338. With 7 text figs. [10 refs.]

The worm-count method of DARLING is the most accurate now available for the determination of the infestation of individual patients, and it has given valuable information on the relative value of different anthelminthics, on the distribution of the different species of human hookworms, on the worm index of various population-groups, and on the evaluation of the results of control measures. It is, however, very expensive and time-consuming. The radical treatment necessary tends to prejudice the people against the remedy in the early surveys, even if there are no accidents. It frequently involves the payment of patients, which is a serious obstacle to the subsequent widespread treatment of primitive peoples. It is, however, just as important to know the number of eggs being deposited on the soil by individuals as to know the number of adult hookworms they harbour. In the studies in Porto Rico reported by the authors of this paper the technique introduced by Stoll for egg-counting was utilized. The output of eggs of any given population-group is a measure of the potential dissemination of the parasite, and this information, as obtained by egg-counts, is of importance in planning control measures. The males in the population had a considerably greater average egg output between the ages 20–45 than the females, although in the most heavily infested area the female output was higher. Arranged in age-groups the youngest showed a low output, gradually increasing up to the age of eight years; thence to eleven years of age there was a very rapid increase. During adult life the age-groups did not differ appreciably,

* For xii–xviii. see this *Bulletin*, Vol. 20, pp. 949–51.

but after 50 years there was a distinct increase. The quantity of egg output can be correlated with the habits of the people, and in different areas with the amount of previous treatment and sanitation. In the most heavily infested of five areas studied there was a reduction of 91·9 per cent, in the egg output after treatment. It is suggested that Stoll's method should form part of the general routine in surveys made before the introduction of control measures or for the evaluation of such measures.

xxi. **On the Use of an Egg Counting Method in Soil-Culture Studies of Hookworm Larvae. (Preliminary Report.)** [STOLL.] pp. 339–342. [3 refs.]

A combination of BAERMANN'S technique for the isolation of hookworm larvae from soil and Stoll's egg-counting technique (this *Bulletin*, Vol. 20, p. 950) has been used in a study of the hookworm culturing possibilities of certain soils. Three typical soils were used, (a) black humus, common under the rich forest and banana growth and especially typical of the coffee estates, (b) sandy soil or alluvia such as is found in the pockets which result from the action of heavy tropical rains, and esteemed for its value for tobacco and other crops, (c) clay. The soil samples were first heated to kill free-living nematodes and then used in 100 gram amounts in small culture-pans mixed with 10 grams of infected faeces. The tests made showed that the cultures of faeces alone produced embryos at the rate of 15 per 10,000 ova. The ova in control cultures of the same faeces made up with charcoal according to LOOSS' method gave 16·25 per cent. of larvae. In the clay soil mixtures only 2·74 per cent. of the ova introduced were recovered as larvae. From mixtures of faeces and loam and faeces and sand about 26 per cent. of the ova reappeared as larvae, while in the mixtures of faeces and humus the high average of 65·22 per cent. was secured, and occasionally cultures were over 90 per cent. effective. The humus proved consistently good and showed less variability than any other soils. It is noted that with the Baermann apparatus only one-third or one-half of the larvae in clay may be able to get through the apparatus, but allowing for this clay gives an exceedingly low culturing efficiency and under field conditions is probably little higher. These generally negative results from faeces unmixed with soil give a hint possibly of value in the experimental testing of various types of latrines and of concentration methods for disposing of night soil.

xxii. **Further Observations on the Migrations and the Position of Infective Hookworm Larvae in Soils.** [AUGUSTINE.] pp. 416–419. [5 refs.]

Fresh stools containing abundant hookworm ova were placed in the centre of 12 wooden boxes 18″ × 18″ × 12″ filled three-quarters full of moist soil. Some with vegetation, and some without, were placed in a variety of environmental conditions. Ten days later numerous aggregations of larvae could be seen protruding from the more prominent soil clumps and from small pebbles in all the boxes with the unaided eye. The larvae congregated within the circles about 8″ in diameter where the stools had been placed, and in some of the boxes the centres appeared as if covered with hoar-frost so rich was the development of larvae. After one month the soil of the central areas 8″ in diameter

and ½″ deep was examined by Baermann's isolation apparatus. In one instance 11,460 mature hookworm larvae were isolated from this zone, and only 2,020 from the remaining soil of the box. In another case the figures were 97,140 and 2,660 respectively. One month later (*i.e.*, two months after the larvae had reached maturity) the soil of the remaining boxes was examined and it was found that a great reduction in numbers had taken place but that their relative position had not altered. In one box the central area gave 520 larvae, the surrounding soil 20. In another the figures were 60 and 0. The boxes were not specially protected from rain, and it is surprising that more larvae were not recovered from outer zones. A statistical examination of the soil in the boxes was also made to determine the vertical distribution of the larvae. It was found the greatest number of larvae remain in the upper half-inch. In no instance were larvâe isolated from the zone between 2½″ and 4″ from the surface. Green stalks and blades of grass from the boxes were negative. The natural habitat of the hookworm larvae is on or close to the soil surface.

xxiii. **Experiments on the Factors determining the Length of Life of Infective Hookworm Larvae.** [AUGUSTINE.] pp. 420–443. With 4 text figs. [12 refs.]

Numerous carefully plannned experiments are recorded, and from these the following conclusions are drawn :—

In moist soils in Porto Rico few infective hookworm larvae survive longer than eight weeks in deep shade and six weeks in light shade, while in direct sunlight almost all die within five days. They also die rapidly in water-covered soils. The early death of the larvae is associated with the occurrence of fungi, bacteria and protozoa, Alternate drying and moistening of soil hastens the death of the larvae.

Temperature has an important bearing on the larva's length of life. Over 99 per cent. had perished after 9 weeks at 27° C ; at 35° C. all were dead within 3 weeks. At 15° C. the rate of destruction is less than at 27° C. and their length of life longer. At 0° C. the larvae perished within one week.

Dense shade affords the optimum environment for development and survival. Approximately 0·6 per cent. of the original number of infective larvae were recovered 9 weeks after the deposition of an infected stool upon the soil. Heavy rain and the drying of the soil under field conditions are shown to be important factors in reducing soil infestation.

xxiv. **Hookworm Cultures with Humus, Sand, Loam and Clay.** [STOLL.] July Suppl. pp. 1–36. With 12 diagrams. [13 refs.]

A more detailed account is given of the Porto Rico experiments summarized in the preliminary paper No. xxi.

The data obtained from 148 cultures have been further analysed and compared with results from 160 additional cultures made in the laboratory in Baltimore. The conclusions summarized from a series of tables and charts show that in Porto Rico unmodified faeces in control cultures produced negligible percentages of larvae, but even these are shown to furnish important ground itch in infective centres. The intense acidity of the faeces attributable to the predominantly vegetarian diet of the people studied is the cause of the low percentage of developments secured with unmodified faeces. Where the faeces

were neutral in reaction and derived from a mixed diet unmodified cultures gave an effectiveness of 15·2 per cent. Diarrhoeic faeces, in the Porto Rico series, cultured comparably with the unformed mushy type, which were the more usual. The effectiveness of the soils in producing hookworm larvae from infected faeces is in a similar relation to the numbers of their free nematode populations and to the coarseness of the soils.

xxv. **The Use of the Egg-Counting Method in an Intensive Campaign.** [HILL.] July Suppl. pp. 37–60. With 4 graphs. [5 refs.]

In connexion with the intensive campaign in Porto Rico the Stoll method for counting hookworm eggs was used and 515 counts were made during a period of three months. It was shown that with accuracy and without additional expense the technique could be done by the regular staff of native microscopists. The counts revealed the fact that children from 5 to 9 years of age have a relatively heavy infestation, as high as that of adult women, while men are twice as heavily infected. The highest degree of infestation is amongst the field workers, the lowest in the better classes.

Routine treatment reduced the incidence of the infestation 50 per cent. and the egg output 90 per cent.

Clinical diagnosis showed a positive correlation with the degree of infestation as gauged by the egg-count.

The egg-count was almost as efficient as the centrifuge in the diagnosis of infestation in heavily infected areas, but somewhat less efficient with light cases.

xxvi. **An Epidemiologic Study of a Small Village on the North Coastal Plain of Porto Rico.** [CORT, RILEY, PAYNE (George C.) & HILL.] July Suppl. pp. 61–72. With 2 figs.

A small village of 35 houses on the north coastal plain was studied almost exactly one year after the completion of the sanitary campaign in this region, during which all the houses had been provided with latrines. Egg-counts were made on the faeces of 40 people from 9 typical houses. The degree of human infestation was determined by Stoll's method. All latrines and available places around the houses were studied for factors of soil pollution. The degree of soil infestation was determined with the Baermann apparatus. Thirty-six of the forty individuals studied were positive and gave an average output of hookworm eggs of 4,060 per gram. Only four of the 40 people reported previous treatments, and in every case this had been taken more than 5 years previously. It is evident that the presence of latrines for a period of only one year would not reduce human infestation materially even if soil pollution had been entirely eliminated. There was an average egg output of 2,350 eggs in the age-group. 5 to 9 years and in 6 adults over 50 years old the output averaged 6,550 per gram. These heavy infestations of the young and aged cannot be ignored. Evidence obtained showed that, although recently installed, all the latrines were in some degree of use and that concentrated pollution only occurred at a few places, as in the yards of 5 out of the 25 houses visited. After two weeks of gradual drying of the soil in shaded places hookworm larvae were found, but all soil infestation had died out after a period of six weeks. After the treatment-campaign had been completed new soil infestation occurred at a house where three hookworm carriers had moved in.

xxvii. **The Study of an Area in the Mountains of Porto Rico, which had been influenced for Twenty Years by Hookworm Control Measures.** [CORT, RILEY & PAYNE (George C.).] July Suppl. pp. 73–84. With 2 figs.

An area near Utuado with 25 houses, about half of which were satisfactorily sanitated, was studied to determine the present condition as a result of considerable previous hookworm control extending over a period of over 20 years. The average egg output for 111 people was 1,050 eggs per gram, which was by far the lowest for any of the areas studied in Porto Rico. Very little soil infestation was found and the conditions around most of the houses were unfavourable for hookworm development. These results emphasise the importance of the hookworm control work already carried out in Porto Rico.

xxviii. **A Study of a Heavily Infested Group of People on a Sugar and Coffee Estate in Porto Rico, before and after Treatment.** [CORT, PAYNE (George C.) & RILEY.] July Suppl. pp. 85–110. With 4 figs. and 1 map.

A mountain area with much clinical hookworm was taken as a field for study of the etiology of the disease under conditions of gross soil pollution and of intense human infestation. The area had been practically uninfluenced by any hookworm control work either by treatment or by sanitation. Observations were carried out both before and after mass treatment. The area comprised an isolated group of 27 houses on a sugar and coffee estate about 10 miles from Utuado. The average egg output was 7,740 per gram, and the estimated haemoglobin 59·5 per cent. The women were more intensely infected than the men, and the old people showed a high egg-output. The importance of severe cases in the observation of hookworm disease is shown by the fact that about 16 per cent. of the population were putting out two-thirds of the eggs. There was gross soil pollution and practically no sanitation. Almost no soil infestation was found near the houses, but the plantations of cane, bananas and coffee bordering the area were especially polluted. Heavy tropical rains proved here, as elsewhere, an important factor in temporarily reducing soil infestation. The conditions in the coffee cultivations were highly favourable, while that of bare clay soil was unfavourable to hookworm development. A series of treatments reduced the human infestation by 83·4 per cent. in a comparatively short time and there followed a marked reduction in soil infestation.

xxix. **A Study of the Relation of Coffee Cultivation to the Spread of Hookworm Disease.** [CORT, RILEY & PAYNE (George C.). July Suppl. pp. 111–127. [15 refs.]

The relation of coffee cultivation to the spread of hookworm was studied in two areas on coffee estates in the mountains near Utuado, and the results showed that cultivation of coffee was of such importance that in the development of control measures special attention ought to be paid to coffee workers and their environment. A number of previous conclusions, such as the effect of tropical rains in eliminating soil infestation, are found valid in these situations.

xxx. **Studies on Factors involved in Migration of Hookworm Larvae in Soil.** [PAYNE (Florence King).] pp. 547–583. With 12 text figs. [18 refs.]

A series of experiments is related which were undertaken to determine the physical and biological factors bearing upon the vertical migration of larvae in the soil. The larvae live in the soil within the capillary film of moisture surrounding the soil particles. Their activity is increased by temperature up to 35° C. and by contact with other objects. The young larvae are more active than the older forms. Activity is interrupted by periods in which the larvae are refractory to available stimuli. The movements of the larvae are readily oriented by movements in the surrounding soil-water, and this stimulus plays a greater part in orientation than thermal stimuli. It explains to considerable extent the restricted nature of lateral migration on a horizontal surface and of vertical migration on a vertical surface, such as a pit-latrine wall.

Certain theoretical relationships are discussed as between the type of soil and the energy requirements of migration.

xxxi. **The Relation of the Physiological Age of Hookworm Larvae to their Ability to infect the Human Host.** [PAYNE (Florence King).] pp. 584–597. With 3 text figs. [6 refs.]

Experiments were made to test the ability to infect of old larvae, which had exhausted all their nutritive granules, as compared with young and well nourished larvae. The oldest larvae retained their power to infect, but not to such a degree as that possessed by young larvae. Evidence was also obtained tending to show that a prior infestation might have some influence in rendering the establishment of a new infestation more difficult.

R. T. L.

SAWYER (W. A.), SWEFT (W. C.) & SHAW (A. Eland). **Institutional Hookworm Disease in a Non-Endemic Region.** - *Jl. of Hyg.* 1923. Oct. Vol. 22. No. 1. pp. 77–88. With 1 fig. [8 refs.]

Conditions peculiarly favourable for the propagation of hookworms frequently obtain in institutions for children or defectives. At the Hospital for the Insane, Goodna, Queensland, cases of infection with *Ancylostoma duodenale* were first noted in 1889, and have been recorded at various times since. As the region is one of low rainfall and the general population is free from hookworm, and the prevailing worm in Queensland is *N. americanus*, it would appear that there has been a perpetuation of the original infection rather than a series of later importations, for the investigations reported by the authors show that 23·4 per cent. of the whole of the inmates of the hospital were infected and that the ward-rate ranged from 2 per cent. to 72·3 per cent. *Trichuris trichura* occurred in 13·3 per cent. and corresponded generally to the ward-incidence of hookworm. *Oxyuris vermicularis* ova occurred in 4·2 per cent. and *O. incognita* in about the same degree. [*O. incognita* has recently been shown to be the ova of a plant parasitic nematode *Heterodera*.] *Ascaris lumbricoides* was absent. Strongyloides and Hymenolepis each was found but once.

The high ward-incidence of helminth infection tallied with the use of earth-closets with pans. A tabular statement shows that the

proportion of infected coming from infested and non-infested areas of Australia is about the same, strengthening the evidence that nearly all the cases were contracted within the institution. Moreover, the infected persons have the longest average length of stay, whereas if the infection had been chiefly contracted before admission many of the infections would have disappeared as the worms died out.

Another striking fact brought out from this inquiry is that the type of mental impairment of the patients determines the infection-rates in the various wards. The wards containing a considerable number of imbeciles, idiots and epileptics and violent insane patients had been spreading the infection, while others were relatively free.

The average infection in the Hospital was light, for the average loss of haemoglobin was only 2·2 per cent. of the normal in the five wards where the infection-rate was high. A few patients were severely affected, however, and 7 had severe anaemia, the haemoglobin varying from 40 to 55 per cent. of the normal. The blood of ten of the most heavily infected patients showed 11 per cent. to 34 per cent. eosinophilia.

Treatment with oil of chenopodium and carbon tetrachloride was given and the symptoms are carefully recorded. The most general were vomiting and drowsiness. The vomiting most frequently occurred immediately after the magnesium sulphate purge was administered. Drowsiness was noted most frequently in those patients who had received 10 cc. of carbon tetrachloride, but disappeared a few hours later. In doses of 3 cc. carbon tetrachloride was found to be relatively insufficient in removing *A. duodenale* and decidedly inferior to chenopodium in ordinary dosage. In doses of 8 to 10 cc. carbon tetrachloride had a distinct laxative effect. Few important symptoms were encountered, but these large doses are not recommended for general use.

R. T. L.

BERCOVITZ (Nathaniel). **The Hookworm Problem in China.**—*China Med. Jl.* 1923. July. Vol. 37. No. 7. pp. 576–581.

In certain districts of Hainan infection with hookworm is as high as 95 per cent. The problem of dealing with this disease in China is complicated by the facts that night-soil is universally used as fertilizer and that the natives work barefoot in the fields; also owing to the illiteracy of the majority of the people, education in sanitary matters is difficult; lastly, there is no help to be expected from official sources because the central government is unstable and the public health service unorganized. The only measure likely to be effectual is treatment of as many persons as possible and re-examination of them from time to time, with the view of gradually reducing soil pollution.

H. H. S.

LEACH (Charles N.), SCHWARTZ (Benjamin) & LEACH (Florence Dixon) with the co-operation of HAUGHWOUT (Frank G.). **Hookworm Disease: a Clinical Entity in the Philippine Islands.**—*Philippine Jl. Sci.* 1923. July. Vol. 23. No. 1. pp. 105–121. With 1 fig. & 2 plates.

Until recently the opinion was generally held, at least locally, that Filipinos suffered but slightly from hookworm infection. Investigations conducted in and about Manila have shown an incidence of from 40 to 90 per cent. in some of the rural districts. During a short visit to Cebu Island 11 cases were studied. Five showed dusky "hookworm

pallor" and all a considerable degree of anaemia, the haemoglobin varying from below 10 per cent, up to 70 per cent. by the Tallquist scale, and a red-cell count between 1,380,000 and 3,334,000 per cmm. Eosinophilia was not marked, the highest was only 7 per cent. and five patients showed no eosinophiles among the first 200 leucocytes, a condition recorded by others also in severe hookworm disease.

H. H. S.

TOMB (J. W.). **Hookworm Infection in the Coal Mines of Bengal.**—*Indian Med. Gaz.* 1923. Oct. Vol. 58. No. 10. pp. 473–476.

Large numbers of the workers in the coal mines of Bengal are infected with hookworm, but the individual infection is not heavy and no gross symptoms are in evidence, so that it is regarded as of little, if any, economic importance. The haemoglobin percentage of the infected was over 65, while that of the un'nfected was only in the neighbourhood of 80. All the cases were found to harbour both the necator and the ancylostoma, the former being more than twice as numerous as the latter. 4,347 persons were examined, of whom 3,616 were underground labourers and 731 surface labourers. Of the former 72·01 per cent. and of the latter 53·21 per cent. were found infected. 153 mines were found infested out of 184. The village population of the Mining Settlement was then examined. Of the "illiterate lower castes" (Bowries), of 337 examined 43·32 per cent. and of the "literate higher castes" (Hindus), of 504 examined 33·13 per cent. were infected. Lastly, the urban population of the municipalities of Asanol and Raniganj were tested. Of those living in the centre of the town and habitually using latrines 271 were examined and only 26 (9·5 per cent.) were found positive; those living on the outskirts and depositing their excreta on the ground showed a percentage of 29·13.

H. H. S.

MHASKAR (K. S.) & KENDRICK (J. F.). **Anti-Hookworm Campaign in the Tea Estates of Madras.**—*Indian Jl. Med. Res.* 1923. July. Vol. 11. No. 1. pp. 52–64.

A campaign against hookworm was undertaken at Mudis to ascertain: (1) the incidence and intensity of infection in the tea estates; (2) an efficient method of treatment for field work; (3) cost of a treatment; (4) effect of freedom from hookworm on the vitality and energy of the infected. The average incidence and intensity was found much the same as in the districts from which the coolies come. Adult men harbour on the average 68 worms, women 40, and children 30 each. The haemoglobin average of 70 per cent. is the same as that in the coolie of the plains. There is no correlation between the haemoglobin average and the number of worms harboured. One dose of thymol or beta-napthol treatment without purgatives is simple and effective, being sufficient to reduce 90 per cent. of hookworm infection. Betanapthol treatment should, like thymol, be considered not altogether safe for the present. Treatments administered in the morning on a fasting stomach yield the best results. Freedom from hookworm infection diminishes the morbidity and mortality rates and increases the marketable value of labour.

R. T. L.

FÜLLEBORN (F.). [**Ueber die Uncinariasis auf den Kaffeeplantagen Guatemalas.**] [Hookworm Infection of Coffee Plantations in Guatemala.]—Vortrag, gehalten für Pflanzer am 8. July 1922 im Deutschen Verein zu Guatemala. Guatemala; Verlag Stäbler —Imprenta–Elektra. [Preis 25 Cent.] [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Aug. Vol. 27. No. 8. pp. 297–298.]

Hookworm infection is both widespread and severe amongst the labourers in the coffee plantations of Guatemala. Only 6·25 per cent. of the Indians had a Hb figure of 70 per cent. or over, while 24·1 per cent. had less than 20. In some cases the estate owners had undertaken the treatment of their employees with oil of chenopodium with excellent results on the whole, though occasionally toxic effects followed. Where the infection-rate was very high, all, except the smallest children and the pregnant women, were treated every six months. A recommendation was made to give, as after treatment, a 2–3 weeks' course of saccharated oxide of iron.

Proper and adequate latrine accommodation is spoken of and supervision to ensure that these are made use of, though much can be accomplished by treatment only. Porto Rico is quoted as an example.* In 1904 the average haemoglobin percentage was 43·09, but in 1914 more than three-fifths of the population had over 70 per cent. haemoglobin, and the individual working capacity had vastly improved.

H. H. S.

JAEGER (Carl). **Zur Endemie der Anchylostomiasis in den Siedlungsgebieten deutscher Einwanderer in Südamerika.** [Ankylostomiasis in German Settlements in South America.]—*Meunch. Med. Woch.* 1923. Sept. 21. Vol. 70. No. 38. p. 1200

In some districts, *e.g.* Corrientes, as many as 80 per cent. of the German immigrants examined were found infected with hookworm, and in eleven districts the average was 50 per cent. The latter proportion was also found amongst the troops in Corrientes. The drugs used in treatment were oil of chenopodium and a preparation "Isotin Bayer," an aromatic phenol product which is given to adults in doses of 2 gm. three times a day after food, for five days.

H. H. S.

MILLER (Frederick A.). **Hookworm Disease.**—*Proc. Med. Assoc. Isthmian Canal Zone.* 1920. Jan.-Dec. Vol. 13. Pts. 1 & 2. pp. 7–11.

This brief paper summarizes the question of ankylostomiasis in Panama to the end of 1919. Control measures were inaugurated in July 1914, and of 102,239 persons examined 79,175, or 77 per cent., were found infected. "First treatments" were given to 77,467 and of these 18,942 were cured. The drugs used were thymol (60 grs.) or oil of chenopodium (60 minims), both in divided doses, preceded the night before by a saline purgative.

Sanitation and propaganda work were carried on at the same time in accordance with the principles of the International Health Board of the Rockefeller Foundation.

H. H. S.

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* Readers of the Report on Hookworm Infection Survey of Porto Rico dated 1919 to January 1920 (Rockefeller Foundation) will agree that Porto Rico cannot be cited as an example of the effectiveness of drug treatment *per se*. (See this *Bulletin*, Vol. 18, p. 299.)

PESSÔA (Samuel B.). **Pesquizas sobre a ancylostomose. I. "Sobre alguns pontos da endemiologia da ancylostomose em S. Paulo." II. Contribuição ao estudo do tratamento da ancylostomose.** [Researches on Ankylostomiasis. I. "Some Points in its Endemiology." II. The Treatment.]—*Ann. Paulist. Med. e Cirurg.* 1923. May-June & Oct. Year 11. Vol. 14. Nos. 5–6 & 10. pp. 40–49. With 3 charts. [5 refs.]; 115–122. [12 refs.]

Ankylostomiasis exists in severe degree in certain districts of S. Paulo. It is not uncommon for an individual to harbour between 1,000 and 2,000 hookworms. The anaemia, however, is not very great; the haemoglobin is in the region of 60 per cent. unless there is some other cause also acting, such as malaria, defective nutrition, alcoholism. Tables in the text illustrate these points and also the fact that occupation is mainly responsible for infection. Where individuals were living under similar conditions those working in the fields were found to be far more heavily infected than those who stayed at home or went to work elsewhere.

Several series of tests were undertaken to determine the most satisfactory treatment. Mixtures of carbon tetrachloride and ascaridol (the chief constituent of oil of chenopodium) in various proportions were tried. The most satisfactory combination was that containing 1·5 cc. carbon tetrachloride and 0·75 cc. ascaridol in a single dose, followed half an hour later by a purge of magnesium sulphate. 98·9 per cent. of the worms were thus evacuated. The drugs were given in separate gelatine capsules. The dose stated is that for adults. Toxic symptoms were rare; one patient gave cause for anxiety, suffering from fever, albuminuria and jaundice for a week afterwards, but he was an alcoholic subject, and the author, therefore, advises that carbon tetrachloride should not be given to such.

H. H. S.

FÜLLEBORN (Friedrich). **Ueber den heutigen Stand der Ankylostomiasisbekämpfung in den Tropen.** [The Present State of Hookworm Prophylaxis in the Tropics.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Oct. Vol. 27. No. 9. pp. 320–328. [25 refs.]

This paper reviews the question of ankylostomiasis and deals particularly with the results of latrine provision. Reports from different areas are peculiarly at variance. Thus BAERMANN states that in the Dutch Indies the high rate of infection with hookworm (98 per cent.) has remained the same in spite of 10 years' intensive treatment, and the erection of latrines, while in Porto Rico treatment alone, without latrines, has brought about marked improvement.

Improvement is to be gauged, not so much by the "Hookworm Index," *i.e.* the percentage of carriers, as by the proportion of "Hookworm Sick," which depends on the degree of infection of the individual. Considered in this way the apparent contradictory reports are brought more closely into harmony. In one district, by the erection of house latrines, the authorities may aim at eradicating house infection; in another, field latrines are put up with the object of preventing infection of the labourers at their work. Neither alone will protect from re-infection and hence the high carrier rate in both. The paper contains much food for thought and does not permit readily of condensation. Those interested should make a point of consulting the original.

H. H. S.

LAMBINET (J.). **L'Ankylostomiase vaincue dans le bassin de Liège.**—*Rev. d'Hygiène.* 1923. Aug. Vol. 45. No. 8. pp. 673–685.

Judging from this contribution Liège has an excellent record for hygienic effort. In 1903 a Hookworm Dispensary was inaugurated. When the campaign was started between 6,000 and 7,000 of the 26,000 miners were found infected, and in some districts as many as 50–60 per cent. By use of ethereal extract of *Filix mas* excellent results have been obtained. In 1906 the percentage had fallen to 5, in 1912 to 2. Treatment was continued during the war, and at present the incidence of infection is only about 1 in 3,000 and the few infected are nearly always wandering labourers coming from Italy, Northern Africa, or the Congo. Every man before being employed has to submit to examination and is not taken on until he is certified free from infection.

H. H. S.

LANE (Clayton). **An Ordinary Centrifuge with Buckets adapted for Direct Centrifugal Floatation, for Use in the Diagnosis of Ancylostome Infestation.** [Demonstration.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. p. 99.

In a previous communication [see this *Bulletin*, Vol. 20, p. 947] the author maintained that direct centrifugal floatation is the simplest, most certain and most rapid method of concentrating ankylostome ova. At a demonstration before the Royal Society of Tropical Medicine a simplication of the necessary technique was shown enabling the process to be effected by means of the ordinary-sized centrifuge. The special apparatus now required is a bucket with four horns. In the bucket lies the cylindrical centrifuge tube, filled with a concentrated solution of common salt and 1 cc. of suspended stool. A special cover is dropped on to the full tube and is loosely held in position by the horns. It is essential also that (*a*) there be 1 cc. of stool suspended in at least 18 cc. of the concentrated salt solution in a tube ½ in. in internal diameter, *i.e.* one 4¾ in. long, (*b*) the axis of the centrifuge be sufficiently high to take the bucket, (*c*) the D apertures in the top cross-piece be sufficiently large to accommodate the horns and the cover. An ordinary centrifuge so equipped is said to give as satisfactory results as the large centrifuge previously described by the author.

R. T. L.

CAIUS (J. F.) & MHASKAR (K. S.). **The Correlation between the Chemical Composition of Anthelmintics and their Therapeutic Values in Connection with the Hookworm Inquiry in the Madras Presidency. XVII. Antiseptics. XVIII. Cathartics. XIX. Drugs allied to Thymol. XX. Carbon Tetrachloride. XXI. Miscellaneous Anthelmintica. XXII. Summary and Conclusions.**—*Indian Jl. Med. Res.* 1923. July. Vol. 11. No. 1. pp. 92–102; 103–109 [1 ref.] and Oct. Vol. 11. No. 2. pp. 337–346 [15 refs.]; 347–351 [9 refs.]; 353–370 [14 refs.]; 371–375.

XVII. Antiseptics.—That there is no correlation between antiseptic and anthelminthic properties is shown by the behaviour of salol, betol and salicylic acid, and in this paper the fact is confirmed by a study of potassium permanganate, kaolin, naphthalene, phenocoll, methylene blue, duotal (the carbonate of guaiacol), creosote, izal, oleum cassiae and oleum copaibae, all of which proved quite ineffective for hookworms, roundworms and whipworms.

XVIII. Cathartics.—As the majority of vermifuges are gastro-intestinal irritants, claims of anthelminthic value are occasionally made. The authors' experience is that simple purgatives have neither vermicidal nor vermifugal properties and merely hasten the removal of worms which would have passed out anyway. The present paper relates experiments made with magnesium sulphate, phenolphthaleinum, calomel, castor oil, croton oil, aloes and *Acalypha indica*.

XIX. Drugs allied to Thymol.—The high therapeutic value of thymol in hookworm infection is well established. Carvacrol is a good anthelminthic, but decidedly inferior to thymol. The vermicidal action of both thymol and carvacrol and their toxicity for the host "are conditioned by the benzenoid structure, the phenolic character, and the position of the hydroxyl group relatively to methyl." The total destruction of the benzenoid structure leads to the formation of non-anthelminthic toxic compounds,—camphor. Hydrogenation of the benzene nucleus lowers the toxicity towards the parasite and raises it towards the host,—menthol, camphor. Esterification of the phenolic hydroxy group leads to the formation of non-anthelminthic non-toxic compounds,—thymotal.

Camphor has practically no action on hookworms, roundworms and whipworms and is comparatively highly toxic to man.

Peppermint camphor (Japanese menthol) given in 18 grain dose was pleasanter to take than menthol, but its anthelminthic power was less.

Menthol in optimum dose of 18 grains expelled 24 per cent. of the hookworms in 12 test cases. Of four cases infected with Ascaris and six with Trichuris none passed worms. The efficacy of 18 grains of menthol equals that of 10 grains of thymol, of which 60 grains is considered the optimum dose.

Oil of peppermint in the optimum dose of 60 minims (which occasionally caused mild symptoms of giddiness and epigastric burning) expelled 20 per cent. of the hookworms. The worms were dead and contorted as with thymol.

Thymotal in a single dose of 40 grains expelled only 6 out of 580 hookworms, whereas the same dose of thymol administered in the same way expelled 94·5 per cent. of the worms.

XX. Carbon Tetrachloride.—Test cases of hookworm infections were divided into batches and these were treated with increasing dosages of the drug so as to follow the variations in hookworm removal and toxicity.

The drug was shaken up with an ounce of mucilage of gum acacia and dispensed in one single portion in the morning. Epsom salts were given previous to and one hour after the drug. Carbon tetrachloride is a powerful vermicide both for ancylostoma and necator worms. The worms when expelled are dead and flaccid. 5 cc. is the optimum dose for adult Tamils and removes 99·7 per cent. of the worms, giving 83·3 per cent. of cures. This dose is non-toxic to man. The drug is a definite chemical CCl_4, is easily obtainable, easily standardized and does not deteriorate with age. It is more effective and safer than any other drug now in use. Without purgatives the number of worms removed by the optimum dose is the same, but the resulting cures are fewer. In view of the reports by Docherty and Burgess (1922) that 5 cc. produces fatty degeneration of the liver and kidneys in man, no positive conclusions can be reached as to the safety of this treatment until a large number of tests have been repeated. A safe maximum dose seems to be 3 cc., since this has been given in Ceylon to a number of patients without inducing any feeling of discomfort.

XXI. Miscellaneous Anthelminthics.—Tests confirm the general opinion that santonin has no effective action on hookworms. Only 12·4 per cent. of the *A. duodenale* and 1·3 per cent. of *N. americanus* were removed in one test treatment of 5 grains in 58 cases. Chromosantonin is less toxic to the host (symptoms only appearing after 8 grains), but is not more efficient against hookworm. The same applies to Desmotroposantonin, 10 grains of which are required to induce toxic symptoms. The common rue (*Ruta graveolens*), held in high esteem by the ancient Greeks and Romans, is given in some parts of India to children as a remedy for worms. In a series of 65 cases, oil of rue with castor oil, in doses varying from 1 to 60 minims, removed only 19 hookworms out of a total of 787; but in doses of 40 minims (the limit of tolerance) followed in an hour by magnesium sulphate 60 per cent. of the hookwo ms present were expelled. It cannot be recommended, however, on account of its toxicity, weak action and erratic behaviour. It was found ineffective against roundworms (13 cases) and whipworms (20 cases). Embelia, the dried fruit of *E. ribes* and *E. robusta*, is reputed to be taenicidal: it proved ineffective against hookworms, roundworms, and whipworms in doses of 4 drachms, which represented the limit of tolerance.

The seeds of *Butea frondosa* are administered in India in the form of a powder of the kernels. Toxic symptoms were occasionally noticed with a dose of 40 grains. The drug has no action on hookworms. The oil from the seeds—called moodooga oil—in optimum doses of 6 minims was as ineffective as the powder.

Melia azadirachta Linn. is largely used medicinally in India in the form of the oil of margosa and the juice of margosa leaves. Both are ineffective against hookworm.

Pomegranate—the dried bark of the stems and roots of *Punica granatum*—has long been used as an anthelminthic in India. A decoction was made of 2 oz. of bark kept in 2 pints of water for 24 hours and then boiled down to one pint. Four ozs. were given hourly in doses of one ounce, and the last dose was followed an hour later by Epsom salts. No toxic symptoms were noted and no hookworms were expelled, although pelletierine and isopelletierine, the alkaloids of the bark, are well established taenicides.

Quassia according to BARNES cured 70 per cent. of his cases, but following his mode of treatment the authors failed to expel any worms.

Veronia grows wild in waste places near villages throughout India. Its seeds enjoy a high repute there as a remedy for roundworms. Even 4 drachms failed to expel hookworms in 20 test cases.

Coconut is an old Indian remedy for tapeworm. The meat and milk of one nut eaten early in the morning, fasting, will expel tapeworm. No purgative is required. This treatment was found ineffective in the case of hookworms.

XXII. Summary and Conclusions.—This concluding paper lists the names of the 70 drugs which have been reported upon in this series of studies. Twenty were found to possess well marked anthelminthic properties in either maximal or submaximal doses. These 20 substances correspond to 14 chemical compounds which are *all carbon compounds*, 3 being open-chain compounds, 8 benzenoid closed-chain compounds and 3 non-benzenoid closed-chain compounds. The authors conclude:—

"Carbon tetrachloride, thymol, betanaphthol and ascaridol were found to be most effective against hookworms and equally efficacious." These four substances are carbon compounds of simple molecular

composition and structure, but "differ so very much in molecular composition and structure that no general correlation can be said to exist between anthelminthic properties and chemical composition or structure. Anthelminthic action on hookworms is, therefore, specific."

R. T. L.

MHASKAR (K. S.) & KENDRICK (J. F.). **A Note on the Interval for Re-Treatment of Hookworm Infection.**—*Indian Jl. Med. Res.* 1923. July. Vol. 11. No. 1. pp. 234–236. [2 refs.]

The benefits of hookworm treatments are evident for at least one year. Hookworm infection is at its maximum in the monsoon months and annual treatment of the coolie population on the tea estates would decidedly improve the general health of the infected. The coolies acquire an average infection of 17·3 hookworms per person within the period of 4 months, 58·9 within nine months and 35·5 within 13 months. These numbers very likely represent maximum re-infections as they are based upon batches of persons most unfortunately circumstanced. The authors' experience is that an infection of less than 20 hookworms per person has but little bearing on the deterioration of health and quality of labour.

R. T. L.

LAMBERT (S. M.). **Ankylostomiasis. Mass Treatment by Carbontetrachloride.**—*Jl. Trop. Med. & Hyg.* 1923. Aug. 15. Vol. 26. No. 16. pp. 61–63.

In discussing plans for hookworm control the author notes that many carriers are left in a district, for the microscope fails to reveal 20 to 40 per cent. of these cases. Another and apparently unsuspected source of error in field work is that in tropical countries the natives cannot read, and the specimen placed in the tin left by the official staff may not be that of the person for whom the tin is intended and whose name appears on the label. Of the two schools of opinion the author belongs to that voiced by Clayton LANE which maintains that infection, however light, deserves complete treatment. This has, however, become merely an academic question with the introduction of mass treatment with carbon tetrachloride, for it is much cheaper to treat the whole population than to select the positives. In Fiji it has been found that one dose of carbon tetrachloride reduced the infection to less than 9 per cent. 27,000 doses were administered without a death and the treatment has shown itself to be popular. If, with proper organization, the whole population were treated on one day a year or twice at six monthly intervals, 90 per cent. of the egg-laying females which cause soil pollution could be exterminated, and in a few years the permanent eradication of the disease as an economic factor would follow.

R. T. L.

HOBSON (Sam). **Carbon Tetrachloride in the Treatment of Hookworm Disease with Report of Cases.**—*New Orleans Med. & Surg. Jl.* 1923. Aug. Vol. 76. No. 2. pp. 80–83. (Discussion pp. 83–84.) [13 refs.]

Carbon tetrachloride is pleasant to take and in ordinary doses (3 cc.) of a pure product induces no ill effects. It should be given on an empty stomach followed in 2 or 3 hours by magnesium sulphate. The author gives records of five cases treated in New Orleans.

R. T. L.

DOCHERTY (J. F.). **Value of Carbon Tetrachlorid as an Anthelmintic.**—*Jl. Amer. Med. Assoc.* 1923. Aug. 11. Vol. 81. No. 6. pp. 454–455.

A comparative estimate is given of the value of thymol, betanaphthol, chenopodium and carbon tetrachloride based upon the treatment of 215 prisoners with *Necator americanus* infection. The results are tabulated with the following comparisions :—

(*a*) *Percentage comparison of worms removed.*

Drug.	*1st treatment.*	*2nd treatment.*	*3rd treatment.*
Chenopodium	81·3	94·5	97·2
Thymol	84·2	94·9	97·4
Betanaphthol	93·0	97·9	99·8
Carbon tetrachloride ...	97·9	99·6	—

(*b*) *Percentage comparison of apparent cures.*

Drug.	*1st treatment.*	*2nd treatment.*	*3rd treatment.*
Thymol	25·0	55·5	86·1
Chenopodium	35·9	58·9	87·2
Betanaphthol	39·6	67·9	88·7
Carbon tetrachloride ...	58·2	83·6	—

Having demonstrated that carbon tetrachloride is the most efficient anthelminthic, the author proceeds to show that the anthelminthic value of this drug is practically unaltered by differences in the number of worms harboured, whereas with chenopodium the relative efficiency arises as the worm count increases. The apparent futility of prolonged treatment is also demonstrated, since in those cases in which the total number of hookworms removed by a complete treatment was 50 or over, 98·9 per cent. were removed by one dose of carbon tetrachloride and 96·8 per cent. by two treatments of chenopodium, 99·4 per cent. by two of thymol and 97·7 per cent. by two of betanaphthol.

After a dose of 3 cc. of carbon tetrachloride followed by a saline cathartic there were no clinical evidences of renal injury, and the drug appears to be a safe and efficient anthelminthic in this dosage.

R. T. L.

COOPER (A. T.). **Some Notes on Recent Advances in the Treatment of Hookworm Disease.**—*Southern Med. Jl.* 1923. Sept. Vol. 16. No. 9. pp. 689–691. [9 refs.]

The writer treated 176 soldiers at Fort Benning with carbon tetrachloride, giving 3 cc. for a dose. No dietetic or other preparation was undertaken. At a subsequent examination of the faeces only five were found to be passing ova of hookworms and one of these five was possibly a case of re-infection.

H. H. S.

KEHRER (J. K. W.) & SOEMADIJONO. **Over Oleum chenopodii en tetrachloorkoolstof als mijnwormmiddel.** [On Chenopodium Oil and Carbon Tetrachloride as Hookworm Remedies.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 5. pp. 709–724.

The authors recommend a mixture of 4–5 cc. carbon tetrachloride and 1·5 cc. chenopodium oil. This dose appears excessive in view of the toxicity of the drug which has lately been emphasized by others. Even higher doses, up to 10 cc., were given by the authors in order to

find out the dose resulting in the highest percentage of absolute cures judging from control for absence of ova in the faeces (concentration method).

They did not, however, make any worm-counts, which considerably interferes with the significance of their experiments, moreover, concerning only small series of patients (10 for each type of cure). There were no accidents, but the patients were very drowsy after the higher doses. As far as concerns chenopodium oil, the authors present some evidence that the worms may get resistant against this treatment in chronic patients after repeated cures. [The annotator having seen fatal intoxications after 3 cc. of the drug and can state that smaller doses than this will remove 95 per cent. of the worms, seriously warns against excessive doses of carbon tetrachloride.]

W. J. Bais.

CALDWELL (Fred. C.). **The Treatment of Hookworm Disease—Chenopodium vs. Thymol.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1920. Jan.-Dec. Vol. 13. Pts. 1 & 2. pp. 110–113.

The relative claims of oil of chenopodium and thymol for use in the treatment of ankylostomiasis are dealt with and the conclusions arrived at are that the former is the more efficient, cheaper, and preferred by the patient as being less unpleasant to take. The question, however, loses much of its importance with the introduction of carbon tetrachloride.

H. H. S.

COBB (N. A.). **The Pharynx and Alimentary Canal of the Hookworm Larva** —*Necator americanus.*—*Jl. Agric. Res.* Washington. 1923. Aug. 25. Vol. 25. No. 8. pp. 359–362. With 1 plate.

Hundreds of different free-living nematodes possess a protrusile spear or onchium, and it is claimed by the author that by the time the larva of *Necator americanus* has become full grown the pharynx is modified into what may be fairly be regarded as a protrusile organ. The author gives minutely detailed figures in support of his contention. The three oesophageal glands open exactly where they could best function if an onchium were present. Moreover, the severe and lasting itching irritation induced by penetration of the skin may be explained better if referred to a secretion than if attributed to the motions of the larvae. Another set of organs named amphids, commonly seen in the free-living forms, are also present in the larva of *Necator americanus*, and correspond exactly in number, form, symmetry, position and structure.

R. T. L.

RAMSAY (G. C.). **The Dissemination of Human Helminthic Infections by Animals.**—*Indian Med. Gaz.* 1923. Sept. Vol. 58. No. 9. pp. 422–424.

In the tea-garden practice in Cachar under the supervision of the author it is very noticeable that the most unhealthy gardens are those where coolies are allowed to keep pigs. To investigate further the theory of the dissemination of hookworms by pigs, six pigs were purchased from tea-garden coolies and their intestines were examined for helminths. Of these one only harboured nematodes of an unrecognized species in the descending colon. Microscopical examination of the contents of the gut showed hookworm, whipworm and roundworm ova in all the pigs. The author's observations show that hookworm ova swallowed by the pig can pass through the gut intact and can continue their life

cycle. "The reason the pig is so dangerous in spreading hookworm is that having gorged himself with human faeces from the jungle around the lines, he returns with his faecal-laden bowel to disseminate his helminthic and protozoal infections around the coolie huts." A footnote adds that eleven additional postmortems were all negative for adult hookworms, but were positive for ova.

R. T. L.

GOODEY (T.). *Necator americanus* **and the Domestic Pig.** *Jl. Helminthology.* 1923. Sept. Vol. 1. No. 4. pp. 161–164. [7 refs.]

Two young pigs, bred in England, were submitted to infection with *Necator americanus* larvae reared from the faeces of cases in the Hospital for Tropical Diseases. In one case a thin paste of faecal matter from the culture was laid on the skin on the groin and the pig held for fifty minutes until the paste had dried. Six weeks later a dose of about 200,000 larvae were administered by the mouth. Two and a half months after the first experiment the pig was killed and the alimentary canal thoroughly searched without result. A specimen of *Oesophagostoma dentatum* was recovered from the large intestine. The second pig received a similar dose of larvae by the mouth on the same day as the first pig and was killed 5 weeks and 3 days later with negative result. In this case 50 adult *O. dentatum* were recovered. The similarity of the eggs of *O. dentatum* to those of hookworms is commented upon as a possible source of fallacy in the examination of the faeces of pigs used for experimental work on human ankylostomiasis.

R. T. L.

DARLING (Samuel T.). **The Occurrence of** *Ancylostoma braziliense* **de Faria 1910 in the Philippine Islands.**—*Jl. Parasit.* 1923. June. Vol. 9. No. 4. pp. 234–235. [5 refs.]

Hitherto *A. braziliense* has not been recorded from dog or man in the Philippines. The author has examined 480 ankylostomes from a pointer pup from Manila. Of these 63 per cent. were *A. caninum* and 37 per cent. *A. braziliense*. The mouth-parts of some specimens of *A. braziliense* possessed the peculiarity that one of the large pair of teeth, sometimes both, had truncated ends, thus giving the tooth a plate-like rather than a tooth-like appearance. This feature occurs also in specimens from Brazil, Sierra Leone and Panama.

R. T. L.

FÜLLEBORN (F.) **Kommt "Küsten-Erysipel" und** *Onchocerca caecutiens* **ausser in Guatemala auch in Mexiko vor?** [Do Coast Erysipelas and *C. caecutiens* occur in Mexico as well as Gautemala?] *Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Nov. Vol. 27. No. 10. pp. 386–390. [1 ref.]

The case of a boy 5 years, a native of Mexico, is described. He had from time to time from the age of 3 years exhibited swelling of the arms and face and a bluish discoloration of one cheek. A younger brother, 3½ years old, showed similar symptoms. The father, an intelligent man, told Prof. Fülleborn that in his district there were many persons (some 30 per cent. of the Indians) suffering from "coast erysipelas," an afebrile condition resembling that of this boy and associated with onchocerca. In this patient no onchocerca was found, but the blood

contained 31 per cent. eosinophiles. Simulium ("coffee-flies"), which ROBLES regards as carriers of the parasite, are very prevalent in the Mexican coffee-plantations. From the history and geographical considerations the author is of opinion that *Onchocerca caecutiens* and coast erysipelas are not limited to Guatemala.

H. H. S.

i GUERRERO (Pastor). [**Juicio critico sobre el estudio de la Onchocercosis Guatemalteca.**]—*La Juventud Médica.* (Guatemala.) 1922. Sept. Year 22. Vol. 19. No. 225. pp. 460–467.

ii RETI (Adolfo). [**Bocio, Mixedema y Filaria.**]—*Ibid.* pp. 471–474.

iii MORA (Carlos Federico). [**Trastornos mentales en un caso de Onchocercosis.**]—*Ibid.* Dec. No. 228. pp. 522–524.

iv SÁENZ (Carlos Fletes). [**Dos Observaciones de Onchocercosis.**]—*Ibid.* pp. 531–532.

[All summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Nov. Vol. 27. No. 10. pp. 395–399.]

i. This paper sounds a timely warning against the *post hoc ergo propter hoc* fallacy as applied to onchocerciasis. The rapid disappearance of symptoms after removal of an onchocerca node does not prove their causative relation. Guerrero states that cases are not followed up to see whether symptoms return; that many with similar conditions do not recover after removal of the tumours; that very likely these are merely coincidental since onchocerciasis and endemic goitre prevail in the same district of Guatemala between the rivers Guacalate and Nahualate; and that, if the onchocerca toxins produced the ocular disturbances and myxoedematous conditions described as lasting for a long period, the effects would be too marked for them to disappear with such startling rapidity as has been recorded.

ii. An interesting theory is advanced to account for the prevalence of goitre, myxoedema and onchocerciasis. Very small amounts of iodine—0·1 mgm. per head per day—suffice to ward off goitre in endemic areas. Sea-salt contains definite amounts of iodine, as do also plants near the sea; water in volcanic regions is rich in it, while those in chalk and magnesium soils contain very little. These findings are applied to Guatemala. In the district between the rivers Guatalate and Nahualate, at an altitude of 4,000 feet, the soil is made up largely of coral chalk and magnesia without iodine, and this is a focus of endemic goitre; below this level, between 2–4,000 feet, is the zone of myxoedema and onchocerciasis, and the water and plants contain no iodine. This element in the body, he states, is antiparasitic and thus prevents infection by onchocerca. Professor FÜLLEBORN, in commenting on this, says that sea-fish, rich in iodine, are not worm-free; also that he knows the onchocerca region which, on the Pacific slopes, is volcanic and has an entirely volcanic subsoil. This militates directly against the theory. The author recommends treating the whole of the population in onchocerca regions with iodine in solution or tablet form every other day, and affirms that the disease would disappear just as variola from a vaccinated district.

iii. An account is given of a man who for two years had been subject to auditory and visual hallucinations, and, later, to headache and delusions of a harmless character, and who, on examination, showed contracted pupils with failure to react to light and convergence, and

loss of tendon reflexes. An onchocerca node was found on the occiput and was excised. From day to day the pupils became less contracted, and after 10 days the hallucinations completely disappeared; the tendon reflexes, however, did not return. The author, albeit with reserve, thinks that the clearing up of the hallucinations resulted from the removal of the node.

iv. Two cases are referred to in this review. In the first the patient had noticed an onchocerca node on his head for some time, when increasing ocular troubles appeared—smarting, photophobia, diminished field of vision, but reading tests practically normal, 5/10. The node was removed and the subjective symptoms cleared up in 4 days and the vision was normal by the eighth day. The second patient had four such swellings on the head, but his only complaint was a little smarting of the eyes. There was some degree of hemeralopia without photophobia. Vision was normal. The nodes were excised and the slight symptoms disappeared.

H. H. S.

BIHLMEYER (G.). **Distomum hepaticum beim Kind.**—*Monatsschr. f. Kinderheilk.* 1922. Vol. 22. pp. 587–589.

COTTIN & SALOZ. **A propos de la valeur des réactions biologiques dans le diagnostic des kystes hydatiques du foie.**—*Arch. des Maladies de l'Appareil Digest. et de la Nutrition.* 1923. Vol. 13. No. 1. pp. 44–59. [34 refs.]

FABRE (Henri). **Ascaridiose à forme typhoïde.**—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 598–599.

HARRIS (H. Elwin). **Intestinal Spasm due to** *Ascaris lumbricoides.* [**Memoranda.**] —*Brit. Med. Jl.* 1923. Dec. 15. p. 1151.

NOVIS. **Partial Obstruction of the Pancreatic Duct by Round Worms.**—*Brit. Jl. Surgery.* 1923. Jan. Vol. 10. No. 39. p. 421.

PORTLEY (Kathleen). **Ascaris Appendicitis.**—*Irish Jl. Med. Sci.* Dublin. 1923. June. 5th Ser. No. 16. pp. 169–170.

RIGBY (Hugh M.). **Acute Haemorrhagic Pancreatitis: Round Worm in Pancreatic Duct.**—*Brit. Jl. Surgery.* 1923. Jan. Vol. 10. No. 39. pp. 419–420. With 1 fig.

TSUJIMURA. **Ueber die Ascaridiasis der Gallenwege.**—*Deut. Ztschr. f. Chir.* Leipzig. 1922. May. Vol. 171. No. 3–6. pp. 398–412. [23 refs.]

Tuberculosis (Correspondence).

Johannesburg,
11th January, 1924.

Dear Sir,

I have just received No. 12 of Volume 20 of *Tropical Diseases Bulletin*, in which appear two reviews of the *Proceedings of the Transvaal Mine Medical Officers' Association*, dealing with tuberculosis among natives.

As I am Chairman of the Sub-Committee which is dealing with the matter, and also head of the Sanitation Department of the largest Group of Mines in the Transvaal, permit me to make a few observations on your review. I would preface my remarks by stating that I appreciate very fully the justice of the criticisms you have made in your review, and that to anyone who has no detailed knowledge of the conditions in South Africa some of our recommendations would certainly seem quite inexplicable. I will therefore take the liberty of burdening you with a short description of the conditions under which we recruit our native labour, and certain of the laws under which we must fit our procedure.

Our native labour, to the number of about 200,000 per annum, is recruited in British South Africa and in a portion of Portuguese East Africa, from the Cape to parallel 22 south. About a quarter of this number come to the mining area voluntarily seeking labour, the remainder are collected by traders and recruiting agents. In the case of natives recruited in the Union of South Africa a preliminary medical examination is made at the town or village nearest to the natives' residence. This examination is usually conducted by a local medical practitioner who has no knowledge of mining conditions, and who deals with the examination of natives as a merely minor incident of his day's work. The examination is perforce only a cursory one, and the guide framed in these recommendations is primarily intended for the guidance of these practitioners, and could not be made more extensive without encountering so much opposition that the ends in view would be defeated.

On arrival at Johannesburg all these natives are deverminised, because of the prevalence of typhus in most of the recruiting areas, and are then examined by a full-time medical officer thoroughly conversant with mine requirements. After arrival on the mine they are again examined by the Mine Medical Officer, the latter examination being intended to be a check on the previous two, and further to eliminate natives whose physique is not suitable to the special conditions prevailing on the particular mine.

The natives recruited in Portuguese East Africa undergo a merely perfunctory medical inspection by a Portuguese medical officer, and the only thorough medical examination takes place on the individual mines. It is quite impracticable to arrange for a thorough medical examination in Portuguese East Africa because of the lack of suitable Portuguese medical personnel for this purpose, geographical difficulties, and the fact that we have been unable to arrange with the Portuguese Government for our own medical men to carry out examinations in Portuguese territory.

Under the law all miners, whether European or native, must undergo a periodical medical examination, which, in the case of the natives, is conducted monthly by the Mine Medical Officers. If the Mine Medical Officer suspects a native of having tuberculosis, the native is sent for diagnosis by the Government Medical Officers attached to the Miners' Phthisis Bureau. If these Officers certify that the native is suffering from tuberculosis, he must be discharged immediately from the service of the mine and repatriated to his home, unless the Native Affairs Department can be satisfied that the travel incidental to repatriation would probably result in fatality.

Practically all the tuberculous natives insist on returning to their kraals.

We have made very extensive enquiries into the possibility of establishing Sanatoria for natives either on the Witwatersrand or near their homes, and authoritative advice is unanimous that such institutions would serve no useful purpose, as the bulk of the natives would refuse to enter these; hence the reason for our recommendation against the establishment of Sanatoria, and the suggestion for utilising existing hospitals, which can take care of the very few cases who have no homes to return to, or who, for any other reasons, are willing to enter an institution for treatment.

To take up some of the specific criticisms you make.—With regard to tachycardia, we quite realise that tachycardia is often associated with early tuberculosis. It is, however, a fact that a very large number of natives have tachycardia unassociated with any disease.

Were we to reject all natives with tachycardia, we would be depriving the mines of a very large portion of their force, and many fit natives of an opportunity of earning a living.

It has not been our experience that functional tachycardia, as we call it, is premonitory of tuberculosis. We therefore take the risk of having such natives sent up to the mines, and leave it to the more experienced Mine Medical Officer, and the greater opportunity he has for correct diagnosis, to decide whether the native should be accepted for work.

We have made no reference to sub-clavicular glands because in our experience these are so exceedingly uncommon among the local natives as to be negligible for the purpose of a preliminary weeding out of undesirable natives.

We quite realise that were it possible for us to keep every recruit under observation for several days we could eliminate a very much larger number of natives with a predisposition to tuberculosis, but this would mean housing arrangements of so extensive a nature and so costly that such a course is beyond the bounds of practicability. We do retain for observation all suspicious cases.

With regard to our definition for the classification of tuberculosis, I freely acknowledge that you are quite correct in your remarks. This classification was adopted practically verbatim from the recommendations of the National Tuberculosis Association of America. We understand the word "constitutional" in these recommendations as including fever. This is quite clear to all our Mine Medical Officers.

Finally, as some proof that our methods of combating tuberculosis on the mines are not altogether unsatisfactory, I may point to the fact that in our Group of Mines, with an average of about 80,000 natives, the mortality from tuberculosis, which in 1911 was 3·7 per 1,000, has gradually declined since then, and in 1922 was 0·78 per 1,000. When I assumed my present appointment in 1914 the mortality was 2·6 per 1,000. Furthermore, in 1916 Drs. Watkins-Pitchford, Stewart and myself undertook an investigation covering some 400 natives, selected at random from two of our mines, with a view of enquiring into the prevalence of undetected tuberculosis among the natives on the mines. We found only one case with open tuberculosis among these 400, and this man was known to be a sufferer from tuberculosis, and was retained on the mine merely because he was an old employee and had no other place to go to. He was employed as a watchman.

I trust you will pardon this rather discursive letter, but I consider it will be of interest to you to know a little more of the facts than appeared in our *Proceedings*.

Yours faithfully,

A. J. Orenstein.

To Colonel S. Lyle Cummins, C.B., C.M.G.

Cardiff, *8th February*, 1924.

Dear Sir,

I have just received your letter, and I beg that you will excuse any point in my notice of the *Proceedings of the Transvaal Mine Medical Officers' Association*, which depended on ignorance of local conditions.

I have never been in South Africa and my knowledge of tuberculosis amongst African natives has been gained entirely amongst the tribes of the Anglo-Egyptian Sudan. My experience in North Africa enables me to appreciate fully the difficulties which you have to face and, at the same time, makes me deeply interested in your problems.

I note that in your letter you frankly admit the justice of some of the points made in my review; and your remarks about the others are so interesting and so important that I have ventured to send your letter to the Director of the *Tropical Diseases Bureau* with a request that he should publish it in the *Bulletin*, so that you may speak for yourself.

It is very interesting that you have found no supra-clavicular glands amongst the South African natives.* Their importance amongst the Senegalese is reiterated by Dr. Borrel in a recent publication ("Hygiène et Pathologie des Contingents Coloniaux en France," Congrès de la Santé Publique et de la Prévoyance Sociale, Comptes Rendus des Séances, 1922, September 11–17) which I have just been reviewing for the *Bulletin*. I do not recall having found this sign in infected patients from the Sudanese battalions in North Africa, but this may be because I did not then know about it or especially look for the enlarged glands.

It had not occurred to me that a short period of observation was impossible on account of the cost of housing arrangements. I should have thought that shelters of a very primitive kind, and costing little more than a few hours' work by the natives themselves, would have served this purpose in a country where plenty of space might be expected to be available; but in this I am open to correction.

I still feel that there are grave risks in treating progressive cases of pulmonary tuberculosis in the wards of general hospitals, but I am sure that these risks could be greatly diminished or entirely removed by housing such patients in cheaply constructed open-air shelters in the grounds of general hospitals, where they would be separated from other patients and still be under conditions ideal for their disease. Here, again, there may be difficulties of which I am not aware; or this may be done already.

The figures that you so kindly give in support of the efficiency of your methods of combating tuberculosis are to my mind most striking and encouraging; and it is a pleasure to close this letter with my warmest congratulations on the success that has attended your labours.

The *Proceedings of the Transvaal Mine Medical Officers' Association* make to me most interesting reading and constitute a most valuable record about tuberculosis in native races. That is one of the reasons why I have devoted considerable space to Summaries of them in the tuberculosis portion of the *Tropical Diseases Bulletin*.

Yours faithfully,

S. L. Cummins.

Dr. A. J. Orenstein, Johannesburg.

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*P.S., 24th Feb.—I find, to my great regret, that owing to an error of my own, either in my manuscript or in proof-reading or in both, the expression "sub-clavicular glands" was used in the summaries to which Dr. Orenstein's letter refers. The "glands of Borrel" are described by him as "sus-claviculaire" or supra-clavicular. I have a case of pulmonary tuberculosis in a Greek child at present under treatment in which such a gland is both visible and palpable in the hollow just above the clavicle. A deliberate search for these supra-clavicular glands in native mining personnel in South Africa would be of great interest.

S. L. C.

Medical Zoology (Correspondence).

Fantham (H. B.). **Some Parasitic Protozoa found in South Africa. V.** (Abstract).—*South African Jl. Sci.* 1922. Dec. Vol. 19. pp. 332–339.

Shortt (H. E.). **The Pathogenicity of Insect Flagellates to Vertebrates, with Special Reference to** *Herpetomonas ctenocephali*, **Fantham.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 908–933. With 1 plate.

Regarding the remarks of the reviewer, A. A., on page 780, vol. 20, No. 10 of this *Bulletin* (October 1923), on an experiment of mine with *Herpetomonas muscae domesticae* and a young white rat, I would point out that the account published by me was an Abstract, and that the paper in which the account occurred is clearly headed Abstract. Needless to state, the young rat, bred from parents of a known stock, was kept in an isolated insect-proof cage. In these days of financial stress, reiterations of research methods, which have become matters of ordinary scientific practice, are often not accepted for publication in scientific journals, because of the cost of printing and publishing. Remarks on "crudity," "bad company" and "reservation of judgment" are, in this connexion, inaccurate and unnecessary.

Regarding certain statements by the same reviewer on page 785 of the same *Bulletin*, I am sorry to have to differ from his remark that I found "uninucleate forms" to be "frequent." As a matter of fact I found few such forms and those only in a very few animals, and leishmaniform types of non-flagellate parasites only were considered in making deductions regarding non-flagellate forms. Indeed, in a paper by Dr. A. Porter and myself, published in January, 1915, in *Proc. Camb. Philosoph. Soc.*, vol. xviii, p. 46, it is stated that we did not observe many small rounded uninucleate elements, and that such elements need further consideration and do not occur in natural leishmaniases. In a paper published in June, 1915, in the same journal, on p. 142 "seemingly uninucleate elements" are mentioned and it is stated that "on careful analyses" they were "ascertained to be really binucleate." Again, on p. 143 "some uninucleate forms were present" but were "rare." In another paper by Dr. Porter and myself, dealing with experiments on birds (*Annals Trop. Med. & Parasitol.* vol. ix, Dec. 1915) "uninucleate forms" are mentioned on p. 546, but are stated to be "few." Accompanying these memoirs we published two plates, containing 60 figures, but not a single uninucleate form is drawn, simply because we saw them so rarely, and they were not necessarily of direct significance. Again, the statement is made that "many vertebrates are infested with herpetomonads of their own." Precisely, and I was among the first to show that herpetomonads occurred naturally in the blood of certain vertebrates, and so took extra precautions to ensure that my experimental animals were clean before they were used. Herpetomonads also occur naturally in the alimentary tracts of certain vertebrates. That herpetomonads can be experimentally introduced into laboratory-bred vertebrates, repeatedly examined for parasites before use and proved to be clean, is really only reproducing a natural phenomenon and need occasion neither surprise nor controversy. It is to be regretted that apparently certain workers have been unable successfully to perform such experiments.

H. B. Fantham.

A reviewer must deal with facts and inferences from the facts as they stand published in the text reviewed. In summarizing both of the papers referred to above (this *Bulletin*, Vol. 20, Fantham p. 780, and Shortt p. 784) that principle was observed strictly.

A. Alcock.

REVIEWS AND NOTICES.

HEGNER (Robert W.) & TALIAFERRO (William H.). **Human Protozoology.**—pp. xix + 597. With 197 figs. and 2 coloured plates. 1924. New York: The Macmillan Company. [Price not stated.]

This book is meant primarily for students in the School of Hygiene of the Johns Hopkins University, but undoubtedly it should find wider use and favour. It gives a concise and coherent general account of the biology of the Protozoa, group by group, as exemplified by representative species and deals in well digested detail, and in their taxonomic setting, with the species found in the intestine and faex and blood and tissues of man In this detail are included, besides accurate descriptive matter, modes and media of transmission and dissemination, and historical precedence and progress. There is a useful chapter on laboratory methods of diagnosing and dealing with intestinal Protozoa, and various methods of cultivating these organisms are described in appropriate places in the text. Pathogeny is not obtrusive, controversial matters are treated with judgment and moderation, and, for motives of humanity with which most of us will be in accord, the peevish distractions of "nomenclature" are deliberately ignored. Some of the digressions from the main line, particularly that on malaria surveys and malaria control, are in every way excellent; others, like genetics and immunology, may reasonably be regarded as out of place in a book intended for beginners in Protozoology. Naturally many Protozoon parasites of lower animals are made good use of in expounding the main theme of the book, and proper stress is laid on the value of this enormous field of study; it is a pity, therefore, to find Proteosoma honoured only by an allusion, and the discovery of its exogenous cycle and exact mode of transmission (which is one of the significant events of history) left unnoticed, and also to meet with nothing but ARAGAO's incomplete account of the exogenous cycle of another instructive Haemosporidian, Haemoproteus, although Mrs. ADIE's interesting completion of the account was published nine years ago.

The book is well documented and well indexed, and it can honestly be recommended to English students whether they be imprisoned in an academic course or have free souls.

A. Alcock.

NICHOLLS (Lucius). **Malaria in Ceylon: A Pamphlet for Teachers.**—10 pp. With 9 figs., 1 chart and 1 folding map. Colombo: Govt. Printer. [Price not stated.]

This admirable pamphlet upon malaria, for the use of school teachers in Ceylon, promises a goodly fulfilment of its purpose; for it not only imparts an account of the causation and methods of prevention of malarial fevers such as a non-professional person can readily grasp, but it also indicates—by a large-scale map showing the topographical incidence of malaria throughout the island—those districts that stand most in need of the instruction provided.

A. Alcock.

SÉGUY (E.) **Histoire Naturelle des Moustiques de France. Étude systématique et Biologique des Moustiques de l'Europe Centrale et Septentrionale et de leurs Parasites.**—225 pp. With 201 figs. 1923. Paris; Paul Lechevalier, 12, Rue de Tournon. [Price 15 francs.]

This admirable little book contains besides a comprehensive systematic study of the mosquitoes of central and southern Europe, an excellent account of the phylogeny, morphology, biology and parasitology of the Culicidae.

A. Alcock.

ELLIS (Henry A.). **Reaction in Relation to Disease.**—27 pp. With 3 figs. 1924. London: H. K. Lewis & Co. Ltd. [Price 1s. net.]

This pamphlet is the reprint of a paper read last year before the Tuberculosis Society of Great Britain, and begins "Life is an acid phenomenon in an alkaline or neutral medium." This is later expanded to mean that living cells form acids, and the maintenance of the reaction most suitable for life is necessary for the continuance of life. In other words, the regulation of the acid-base equilibrium as it is usually termed is a most important part of metabolism, and its upset is followed by disease. The author regards the determination of the reaction of the blood, which is only a vehicular agent, as less important than the examination of the actual cells. This, however, is not what he attempts, but he is content with examining what he calls the "overflow" and more especially the overflow via the urine. The result is that he postulates *acid* and *alkaline* people, that is those with acidic and basic tendencies respectively. They differ in various ways, among which the heart was especially examined; he figures X-ray pictures of the normal, "acid" and "alkaline" heart. Tuberculous people are of the alkaline type, and the practical outcome of all this theorising is the following:—

"We find that the treatment of the tuberculous is essentially *acid*, meats and fats, and where there is a dislike of these forms of nourishment we give Virol, malt and oil mixtures, and acid tonics."

High altitudes and the open air are also beneficial since they tend to "acidosis."

The paper closes with some urinary analyses, though the table headed "concealed acid" is puzzling.

Such I take to be the gist of the paper; it is by no means easy to be sure what the author means, for he has not got the gift of lucid writing. The ordinary medical man will no doubt be puzzled by such technical expressions as hydrogen-ion concentration and P_H which the author does not trouble to translate into plain English. Such readers may be thankful when they see in one of the author's concluding sentences that his deductions are only tentative.

W. D. Halliburton.